The RUBBER AGE

November, 1947

Agerite Stalite

R.T. VANDERBILT CO. N.Y. AMERICAN PRODUCTS

AGERITE STALITE is a superior general purpose, free flowing liquid, antioxidant.
Readily soluble in rubber and non-blooming.
Minimum staining in contact with lacquers.
Suitable for use in carcass stocks of white sidewall tires.

Readily available

R. T. VANDERBILT CO., INC.

230 PARK AVENUE, NEW YORK 17, N. Y.

LOW HEAT BUILD-UP AND MORE TIRE MILEAGE WITH . . .

ADVANTAGES OF 2-MT OVER THIAZOLES AS SHOWN IN TIRE VULCANIZATES

Rubber stocks accelerated with 2-MT exhibit the following good qualities:

1. **Exceptionally low heat build-up.**
2. **Practically no tendency to revert and exhibit other undesirable effects of long curing.**
3. **Excellent resistance to heat and aging.**
4. **Extraordinary retention of tensile strength, extensibility and resistance to tear, at elevated temperatures.**
5. **Conspicuous resistance to flex cracking.**

Data accumulated from laboratory, plant and road tests prove beyond a doubt that the exceptional quality imparted by 2-MT to natural rubber compounds results in vastly improved truck tire performance. The outstanding advantages of 2-MT are the low heat build-up and the remarkable heat and age resistance that it imparts to stocks without resorting to low sulfur ratios. All of these plus values can be translated into higher mileage and longer life for your tires.

Accelerator 2-MT (thiazoline) shows advantages over MBT (thiazole) similar to those which the thiazoles provided over earlier types of accelerators.

The structural formula of 2-MT shown above reveals some relationship to mercapto benzo thiazole, but in its behavior the following favorable differences will be observed:

1. At vulcanizing temperatures below 267°F. its speed and strength are equal but at higher temperatures it is a slightly stronger and faster accelerator.
2. The modulus curve of stocks accelerated with straight 2-MT is slightly steeper. However, when the 2-MT is activated with a guanidine or an aldehyde amine, the modulus curve is flatter.
3. 2-MT is less acidic than MBT. Consequently it can be activated with guanidines or aldehyde amines with greater safety at processing temperatures.
4. Also because 2-MT is less acidic, the use of Retarder W or other organic acids such as stearic acid has greater retarding effect at processing temperatures. However, at vulcanizing temperatures (above 267°F.) this action is reversed and Retarder W activates acceleration.

Although rubber compounds having the most desirable physical qualities will be obtained by the use of 2-MT without secondary acceleration, activation with a guanidine or with an aldehyde amine such as Accelerator 808 results in faster cures.

Rubber Chemicals Division

E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

DU PONT RUBBER CHEMICALS

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

DU PONT
REG. U. S. PAT. OFF.

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PUBLIC LIBRARY
DEC 5 - 19
DETROIT

SUPERIOR ABRASION RESISTANCE

Parts made from HYCAR synthetic rubber have 50% greater abrasion resistance than parts made from natural rubber. That means they'll last longer, give more dependable performance in the most severe service, and save maintenance and replacement time.

But that's only one of HYCAR's unusual and valuable properties. Examine the list in the box at the right. Think of these properties in terms of your requirements of rubber parts. Realize that these properties may be had in an almost limitless number of combinations, each designed to meet the specific service conditions of the finished part.

We have developed more than 5000 recipes for HYCAR compounds — each compound engineered to do a certain job. If you're looking for rubber parts that will give long life, dependability, and economical operation, *specify HYCAR.*

Ask your supplier for parts made from HYCAR. Test them in your own applications, difficult or routine. You'll learn for yourself that it's wise to use HYCAR for long-time, dependable performance. For more information, please write Department HB-11, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

CHECK THESE SUPERIOR FEATURES OF HYCAR

1. **EXTREME OIL RESISTANCE** — insuring dimensional stability of parts.
2. **HIGH TEMPERATURE RESISTANCE**—up to 250° F. dry heat; up to 300° F. hot oil.
3. **ABRASION RESISTANCE**—50% greater than natural rubber.
4. **MINIMUM COLD FLOW**—even at elevated temperatures.
5. **LOW TEMPERATURE FLEXIBILITY**—down to —65° F.
6. **LIGHT WEIGHT**—15% to 25% lighter than many other synthetic rubbers.
7. **AGE RESISTANCE**—exceptionally resistant to checking or cracking from oxidation.
8. **HARDNESS RANGE**—compounds can be varied from extremely soft to bone hard.
9. **NON-ADHERENT TO METAL**—compounds will not adhere to metals even after prolonged contact under pressure. (Metal adhesions can be readily obtained when desired.)

Hycar
Reg. U.S. Pat. Off.
American Rubber

B. F. Goodrich Chemical Company
A DIVISION OF THE B. F. GOODRICH COMPANY

This advertisement appeared in a long list of carefully selected business papers TO HELP YOU SELL parts made from HYCAR.

PHILBLACK-O
THROWS ABRASION FOR A LOSS!

Look at that little guy . . . Philblack-O! A triple-threat star . . . a black marvel. One of the rubber industry's selections for All-American!

Watch him . . . **TACKLE** the toughest abrasion jobs . . . **BLOCK** cut and crack growth . . . **PASS** for long gains with good flex life . . . **SCORE** with easy processing . . . **KICK** that extra point with low heat build-up.

Send for a trial order today. Give him a position in your rubber products and make him the star in your line-up.

PHILLIPS PETROLEUM COMPANY

Philblack Division

EVANS SAVINGS AND LOAN BUILDING · AKRON 8, OHIO

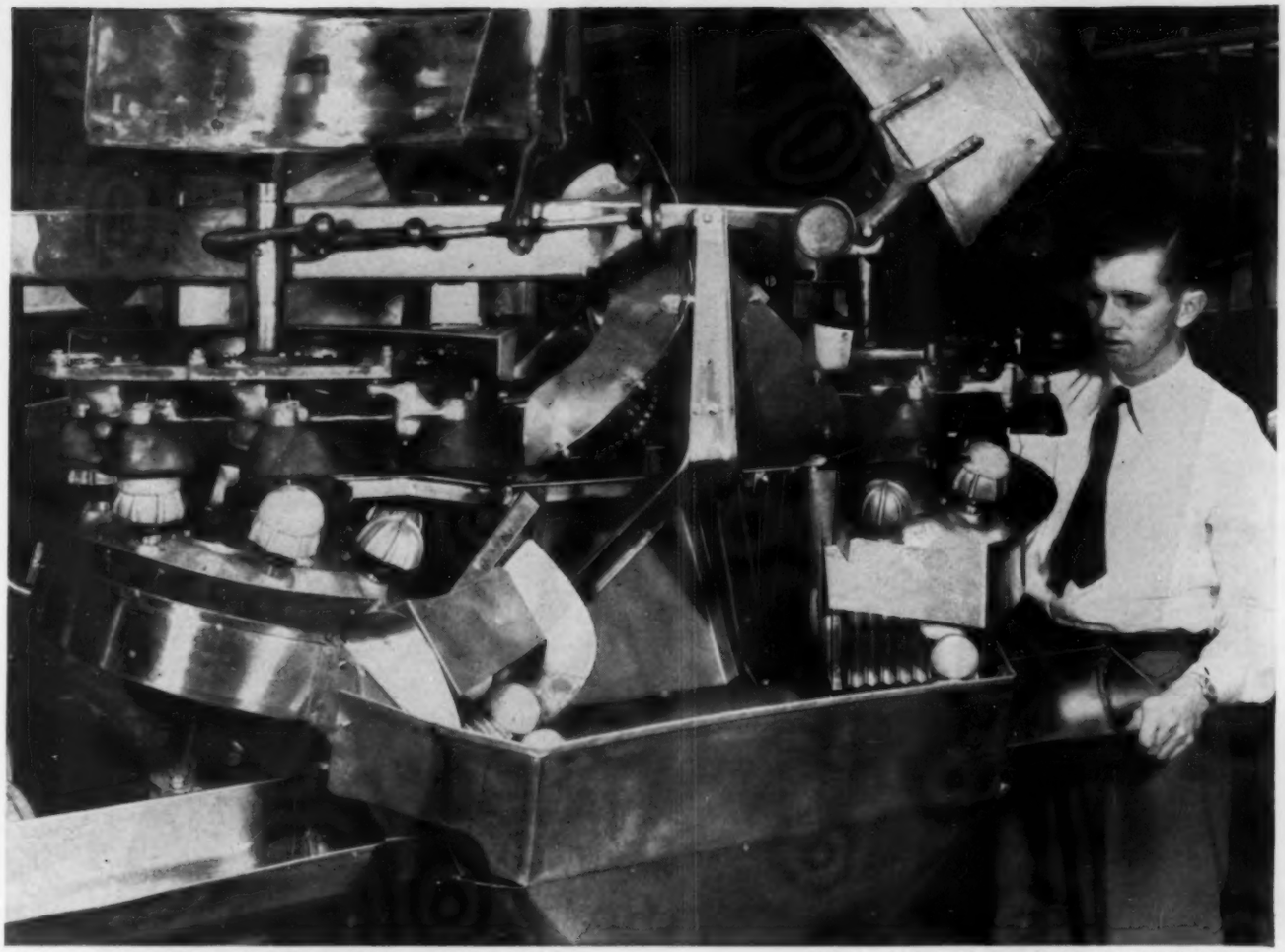


Photo courtesy Brown Citrus Fruit Machinery Co.

Juice cups molded by Kirkhill Rubber Co.

A Squeeze Play that benefits everyone

FLOODS of vitamin-rich juice are whirled from ripe oranges by this automatic Citrus Juice Extractor.

The squeeze is on the orange halves as they are gripped and firmly pressed against whirling metal cones by cups made from a compound of Geon polyvinyl resin and Hycar American rubber.

Because this composite material is unaffected by fruit oils, acids, moisture, because it is impervious to contamination, because the cups made from it perfectly perform their gripping function despite variation in the size of fruit, important benefits result.

Ripe fruit is fully utilized, waste prevented, a healthful food product is available on your grocer's shelves at modest price, the owners of the machine have substantially reduced the cost of maintenance and operation.

Geon polyvinyl resins and Hycar American rubber are materials for which new cost-saving, problem-solving uses are discovered almost daily. Molded, calendered, cast, or used as impregnants for fibres and fabrics, their versatility may contribute importantly to the product you make and to articles you use daily.

B. F. Goodrich Chemical Company makes no finished products from Geon or from any other raw material. However, we will be glad to work with you on any special problems of application. We are particularly interested in developing new end uses for these materials. For more information please write Department R-11, *B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.*

Geon Polyvinyl Materials

Hycar Reg. U. S. Pat. Off. American Rubber

B. F. Goodrich Chemical Company A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

Good-rite
VULTROL
for use in American rubber compounding
to prevent scorching, and for recovering
scorched stocks
GOOD-RITE AND VULTROL REG. T.M. U.S. PAT. OFF.

For technical data please write Dept. CB-11

B. F. Goodrich Chemical Company

A DIVISION OF THE B. F. GOODRICH COMPANY

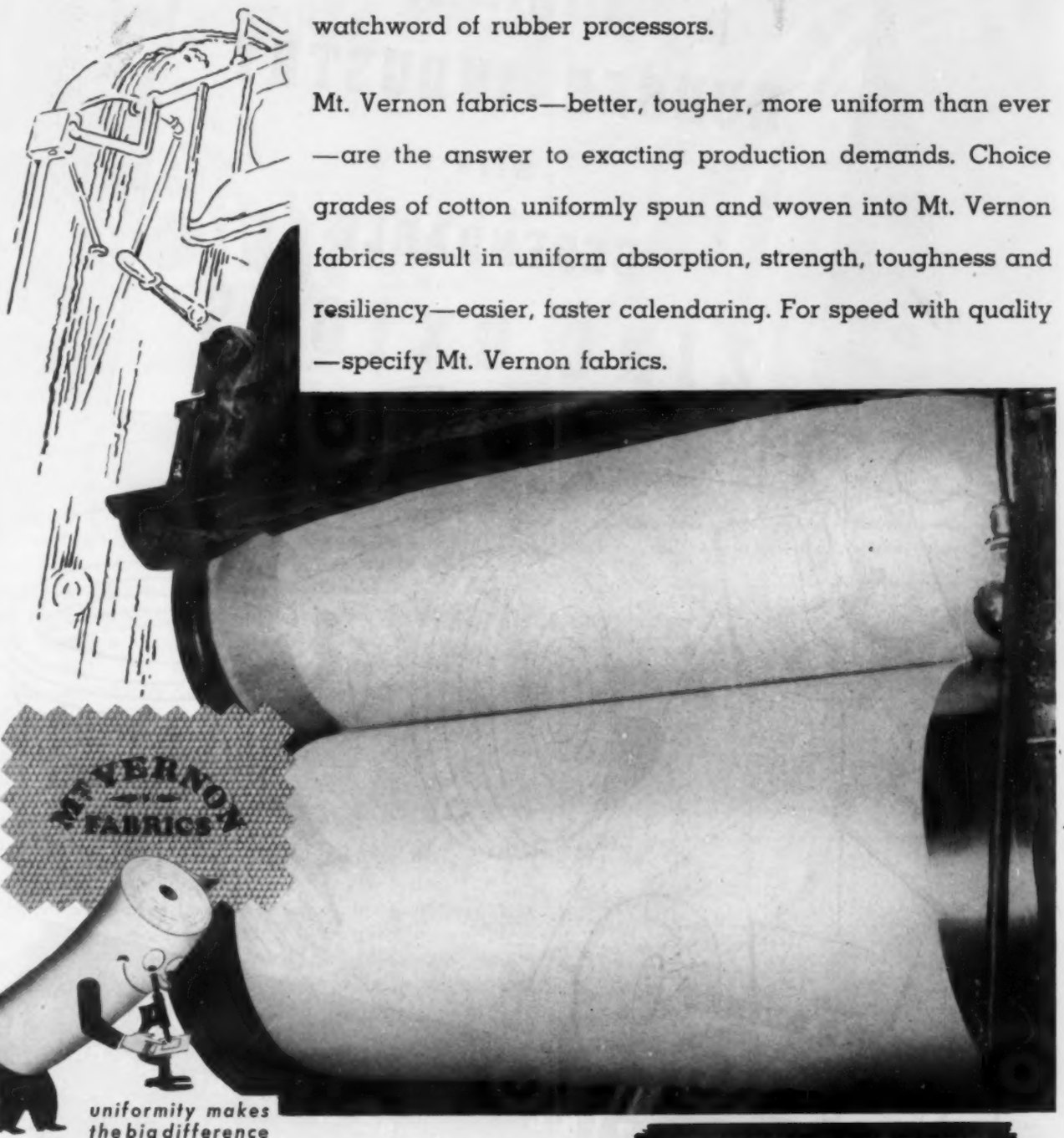
ROSE BUILDING, CLEVELAND 15, OHIO

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

Fabric Uniformity Means Production Speed with Quality

Top production speed consistent with quality is always the watchword of rubber processors.

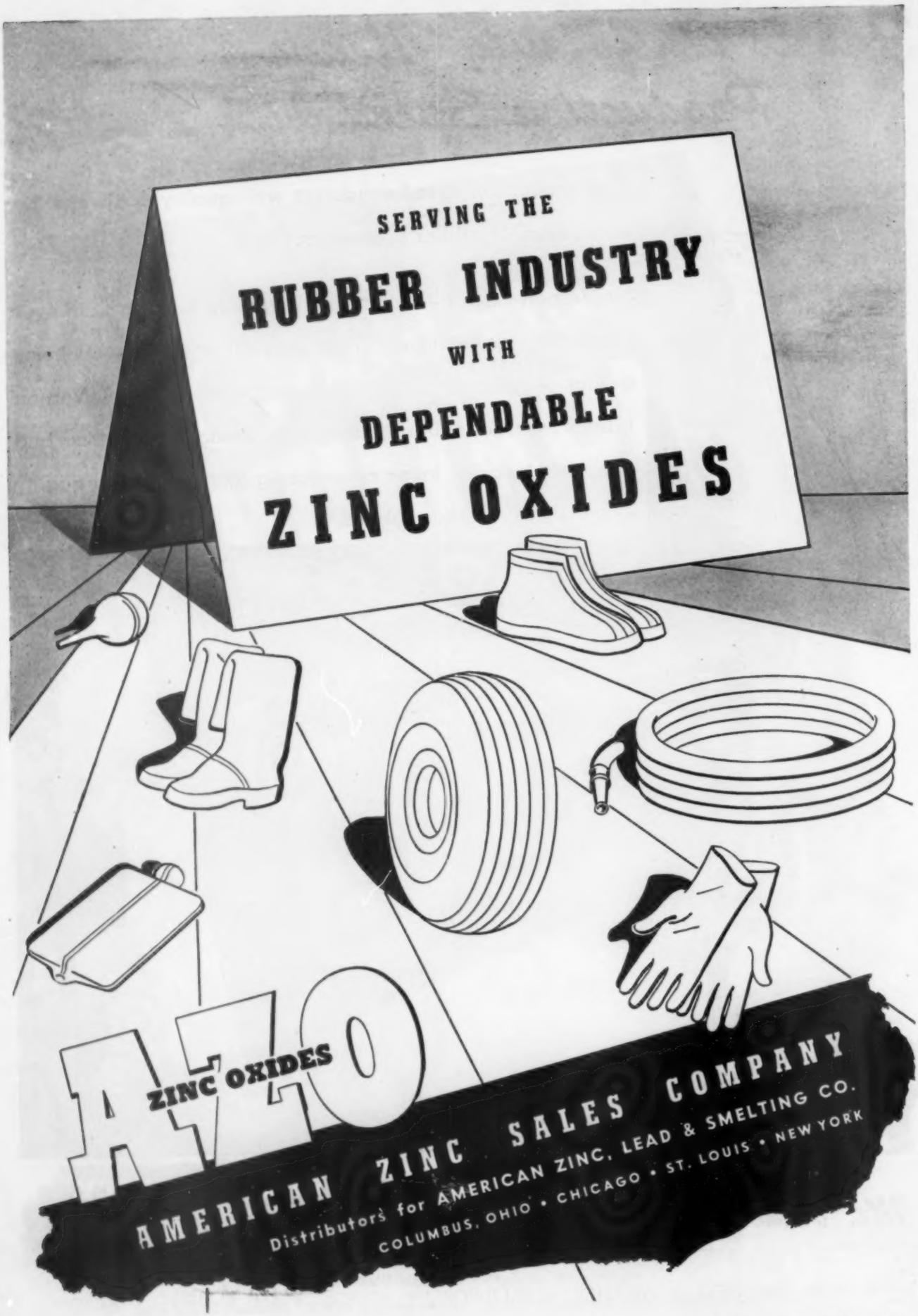
Mt. Vernon fabrics—better, tougher, more uniform than ever—are the answer to exacting production demands. Choice grades of cotton uniformly spun and woven into Mt. Vernon fabrics result in uniform absorption, strength, toughness and resiliency—easier, faster calendaring. For speed with quality—specify Mt. Vernon fabrics.



Mt. Vernon-Woodberry Mills

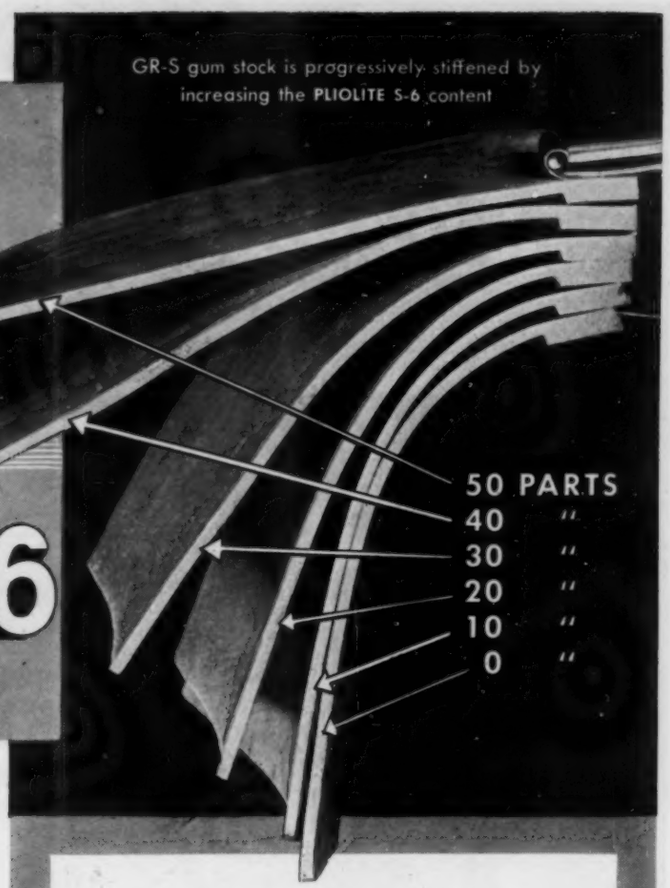
TURNER HALSEY
COMPANY
Selling Agents
40 WORTH ST. • NEW YORK

Branch Offices: CHICAGO • ATLANTA • BALTIMORE • BOSTON • LOS ANGELES • AKRON


SERVING THE
RUBBER INDUSTRY
WITH
DEPENDABLE
ZINC OXIDES
AZO
ZINC OXIDES
AMERICAN ZINC SALES COMPANY
Distributors for AMERICAN ZINC, LEAD & SMELTING CO.
COLUMBUS, OHIO • CHICAGO • ST. LOUIS • NEW YORK

FOR IMPROVED STIFFNESS IN RUBBER AND SYNTHETIC STOCKS— SPECIFY

PLIOLITE S-6

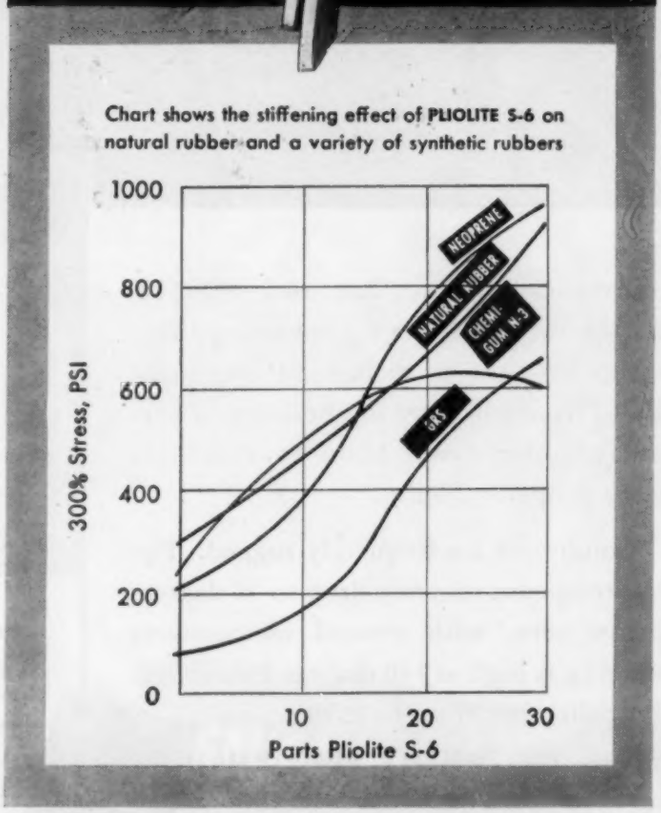


THE above photo and chart show how effectively rubber and synthetic stocks can be stiffened with **PLIOLITE S-6**. This superlative reinforcing agent serves admirably in those applications where the inherent toughness of a well reinforced rubber stock is needed along with added stiffness. Because of its excellent reinforcing qualities, **PLIOLITE S-6** makes possible such items in a wide range of colors. In addition, **PLIOLITE S-6** gives you these other important advantages:

It improves tensile, elongation and tear, gives additional reinforcement to black stocks.

Increases hardness without overloading or overcuring. Increases flex life.

You will find **PLIOLITE S-6** to be highly satisfactory for all compounds needing a light-color, low-gravity stock of 70-95 durometer hardness with good processing characteristics and moldability. Available as a powder for your own mixing, or in master batches in whatever synthetic you select. For complete information and sample, write: Goodyear, Chemical Products Division, Plastics and Coatings Dept., Akron 16, Ohio.

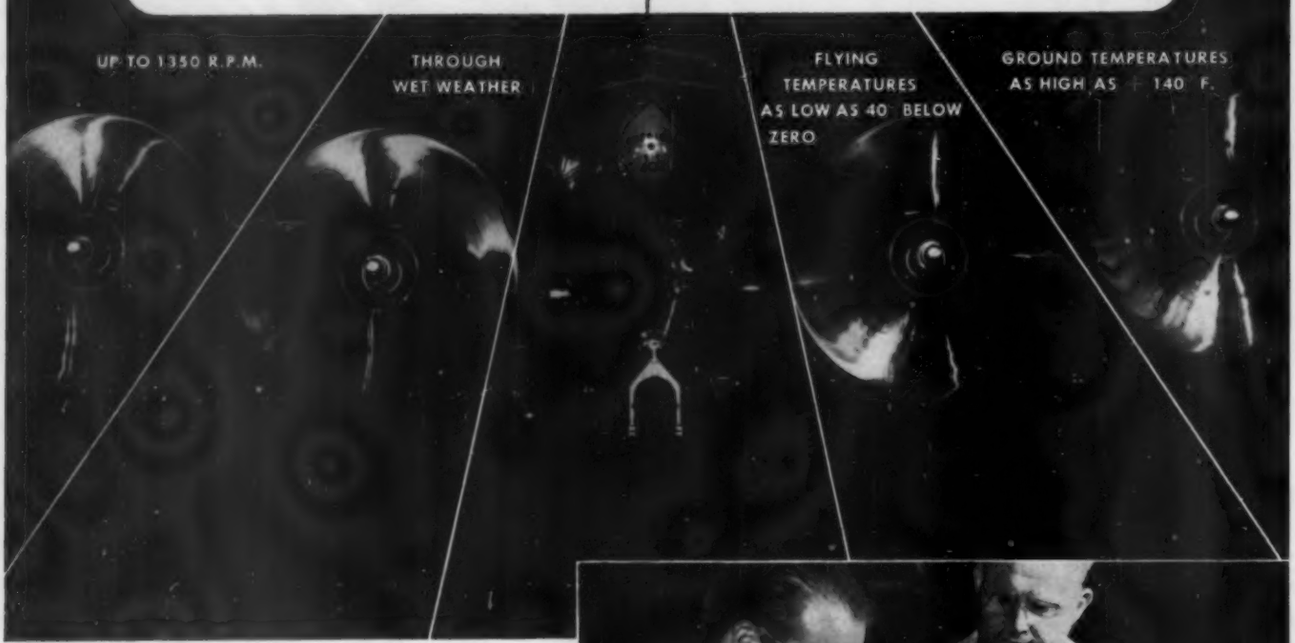


Pliolite—T.M. The Goodyear Tire & Rubber Company

GOODYEAR

THE GREATEST NAME IN RUBBER

No Adhesive Works Under Tougher Conditions than BOSTIK does here



American Airlines has used BOSTIK *Customized* Adhesives for ten years. This company rates as their most important BOSTIK application the bonding of synthetic rubber deicer boots to aluminum alloy propeller blades.

Conditions are frequently rugged. Flying temperatures often drop to 40 degrees below zero, with ground temperatures ranging as high as 140 degrees Fahrenheit. Propellers whirl up to 1350 r.p.m. — and the weather's often wet.

Says Mr. Everett Carlson, (right), General Foreman of American's Engine Overhaul Department: "BOSTIK *Customized* Adhesives have been extremely effective in our work . . . BOSTIK actually outwears the deicer boot itself! It's easy to apply, sets quickly. We can send a plane into the air *within 30 minutes after application.*"

Write for full information today . . . ask for your copy of "Adhesive Facts."

There's a BOSTIK *Customized* Adhesive that will bond any material to any material in any combination. Bring *your* bonding problem to B. B.

B B CHEMICAL COMPANY, CAMBRIDGE, MASS.

"Whatever It Is BOND IT WITH BOSTIK"

Customized Adhesives

NOW AVAILABLE

Tank Car Shipments of Dispersite* for cotton, rayon and nylon tire cord

Tank Car Shipments mean—

- Savings up to 8 per cent in material costs
- Lower Handling Costs—no drums to handle or empties to return
- More uniform quality
- Greater safety during shipment in cold weather

Tank car shipments of your regular tire cord dipping Dispersites* are now available as well as a complete line of new Dispersite*-Latex mixes ready for use.

We will gladly supply a complete engineering and technical service to insure proper installation of equipment and use of the best handling methods in your own plant, based on installations of proven value. Write or call your nearest Naugatuck Chemical Branch office for details.

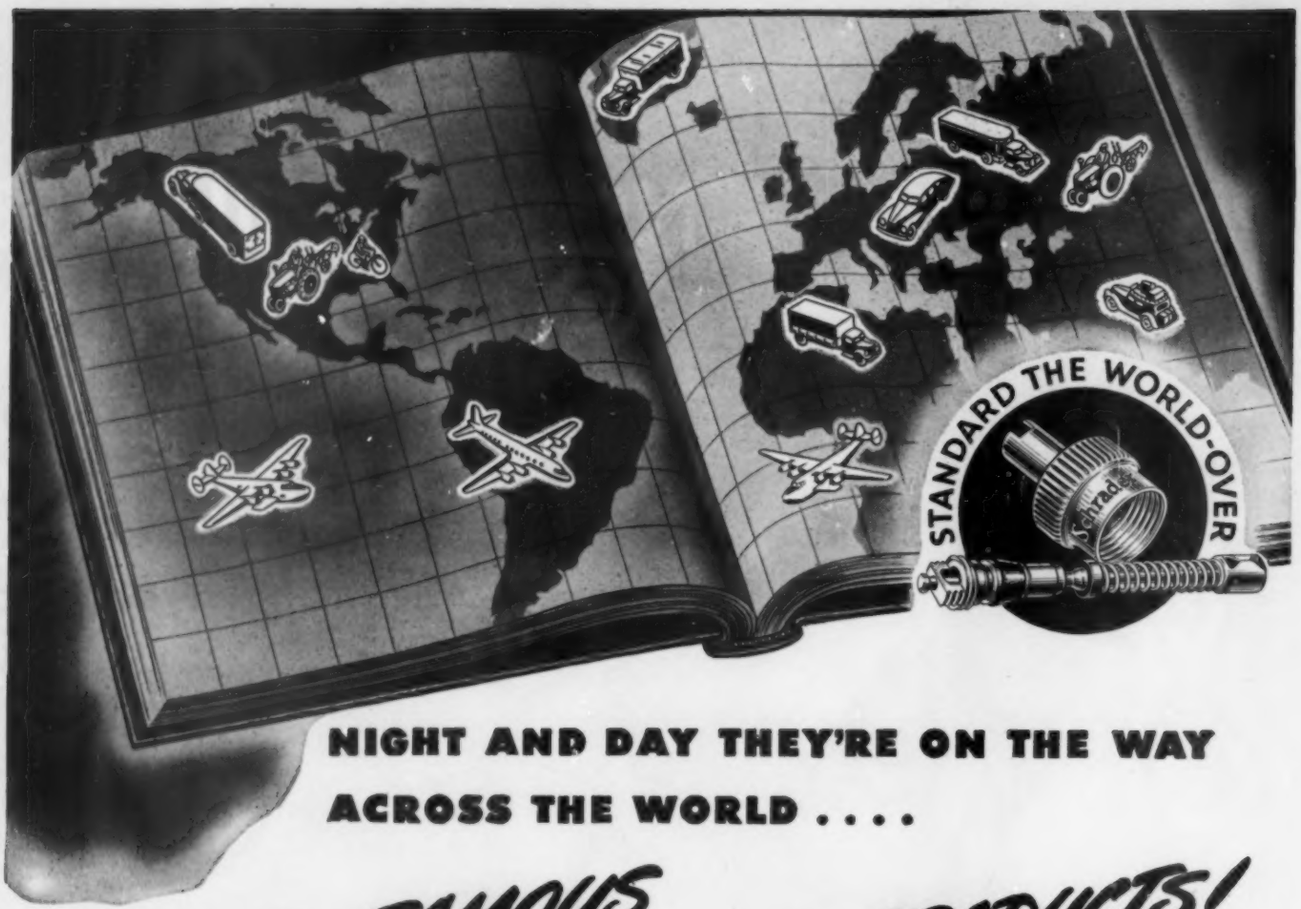
NAUGATUCK CHEMICAL

Division of United States Rubber Company

NAUGATUCK, CONNECTICUT

BRANCHES: AKRON
BOSTON • DETROIT
LOS ANGELES • NEW YORK
PHILADELPHIA

*Reg. U. S. Pat. Off.



NIGHT AND DAY THEY'RE ON THE WAY ACROSS THE WORLD . . . .

WORLD FAMOUS SCHRADER PRODUCTS!

● 24 hours a day, 365 days a year, in every country in the world, Schrader Products are serving the transportation industry, the motoring and bicycling public, and the farmer.

The motor freight that rolls along the Alaskan Highway, the taxi that chugs up the Khyber Pass, the plane that soars over the Andes, and the tractor that pulls the plow across our own country's far-flung acreage all depend on Schrader precision-engineered valves and accessories for top tire performance and economical operation.

Scientifically-built Schrader Cores make tire valves absolutely air-tight under every operating condition . . . and neither the incessant pounding of a truck tire over rocky terrain nor the sudden impact of a plane's tire on the concrete runway can budge a Schrader Cap once it's put on finger-tight.

Similarly, the accuracy of Schrader Gauges, the efficiency of Schrader Vulcanizers, the durability of all other Schrader Tire Valve Tools and Equipment have won the respect and admiration of jobbers, dealers and users alike.

ONE SOURCE — Schrader PRODUCTS CONTROL THE AIR — ONE RESPONSIBILITY

A. SCHRADER'S SON, *Division of Scovill Manufacturing Company, Inc.,* **BROOKLYN 17, N. Y.**

ORIGINATORS OF THE COMPARATIVE AIR LOSS SYSTEM FOR FLAT TIRE PREVENTION

Butaprene NAA

GIVES POSITIVE SEALING *in SR-6 and SR-10*

VOLUME CHANGE
70 HRS. @ 80°F.

SR-10	**+ 2.86%**
SR-6	**+38.00%**

DUROMETER 53

LOOKING for a rubber that will give you a positive seal in either aliphatic or aromatic fuels? Then specify Butaprene NAA. You get a positive volume change that assures a tight fuel system regardless of the type fuel used. Yet Butaprene NAA gives long, dependable performance because of its high fuel resistance.

Positive sealing is just another *plus* feature of the Butaprene N polymers that helps simplify your compounding problems. The Butaprene technical staff will be glad to work with you on any problem involving the use of Butaprene N elastomers in either latex or solid form. Simply write Xylos Rubber Company, Distributors, Akron 1, Ohio.

Listen to the Voice of Firestone every Monday evening over NBC

Copyright, 1947, The Firestone Tire & Rubber Co.

FORMULA

Butaprene NAA	100
Medium Thermal Black	100
Zinc Oxide	5
Antioxidant	2
T.M.T. Disulfide	3
Santocure	3
TOTAL	213

NORMAL PHYSICAL DATA
Slab Cures 20' x 312°F.

Tensile psi	1530
Elongation %	555
Durometer A	63

BUTAPRENE N *by* Firestone

AMERICA'S *most* VERSATILE ELASTOMER

UNION PACIFIC

TREASURE MAP OF INDUSTRY

Montana *

WEALTH OF MINERAL DEPOSITS
IMMENSE COAL RESERVES
LARGE LUMBER PRODUCTION
AVAILABLE WATER POWER
ABUNDANT LIVESTOCK
VALUABLE WOOL CLIP
VARIED AGRICULTURE
TREMENDOUS WHEAT YIELD
SCENIC BEAUTY

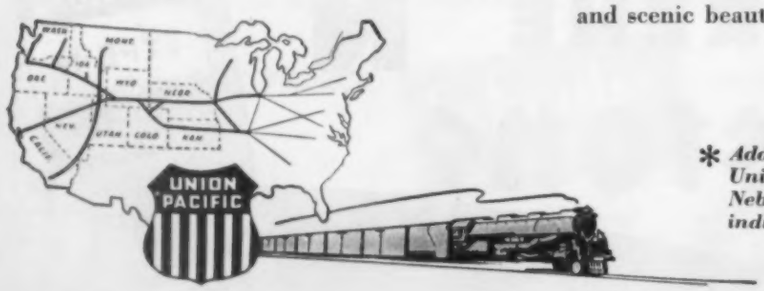
* *One of a series of advertisements based on industrial opportunities in the states served by the Union Pacific Railroad.*

Known as the "Treasure State," Montana is richly endowed with raw materials essential to industrial production. Among the many metallic minerals are silver, copper, lead, manganese, chromium and molybdenum. Coal reserves have been estimated at over 400 billion tons. The majority of the state's cities are supplied with natural gas.

Montana is a top producer of cattle and sheep, the annual sheep production being approximately two million head with a wool clip of great value. In agriculture, wheat takes first rank among grains. Sugar beets, potatoes, together with other vegetables, are grown on its farms. There are many thousand acres of forests, principally pine.

The Union Pacific Railroad serves Butte in the heart of the great mining area, and West Yellowstone—most popular rail entrance to the famous Yellowstone National Park.

Montana welcomes new industry. It has the space, materials, facilities and manpower to encourage firms seeking new locations. Additional advantages are good living conditions, an excellent educational system and scenic beauty.



* *Address Industrial Department, Union Pacific Railroad, Omaha 2, Nebr., for information regarding industrial sites.*

UNION PACIFIC RAILROAD

THE STRATEGIC MIDDLE ROUTE

TESTS SHOW HOW CLOGGED STRAINER SCREENS CHOKE OUTPUT, BOOST HP RATINGS

TAKE a look at the chart at the right. It's a composite of a series of production tests on inner tube stock made on a 10" rubber strainer at the plant of a well-known tire manufacturer.

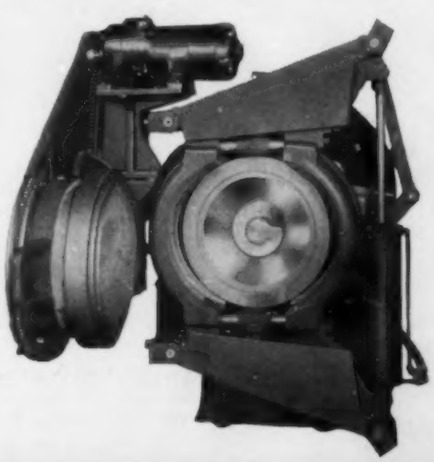
It shows, more clearly than we could ever tell you, how dirty strainer screens reduce output and raise power consumption.

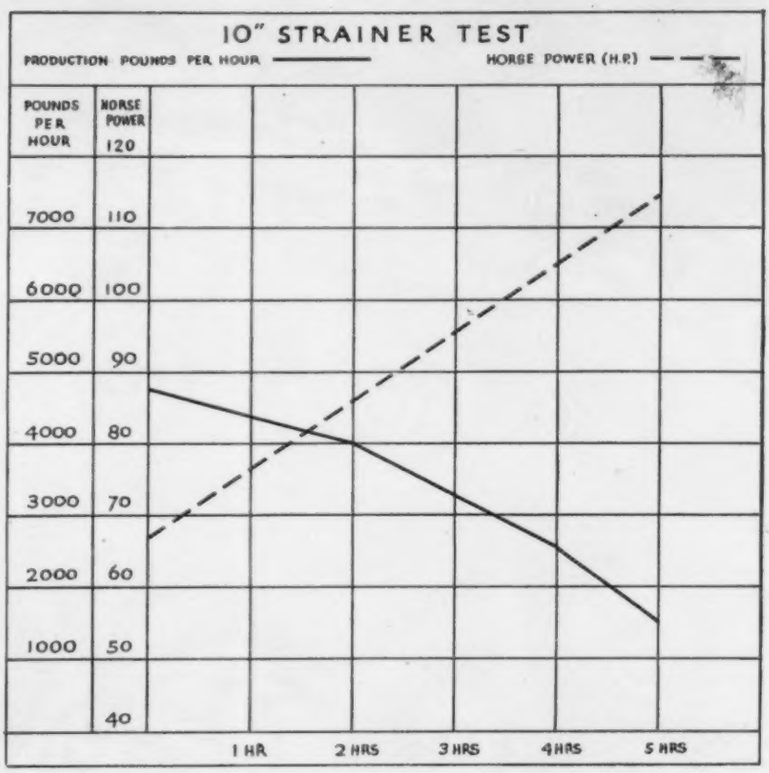
The solid line represents production in pounds per hour; the broken line is horsepower rating.

With clean screens, at the start of the run, note that output is at the rate of approximately 4800 lbs. per hour with about 67 HP required. Then note how at the end of 5 hours, production has been cut to only 1500 lbs., while power consumption has soared to about 115 HP.

Screens must be changed, and changed often, if production is to be kept on an efficient basis. And the key to *frequent* screen changes is *ease* in which they can be changed.

Screen changes that take from five to ten minutes and more with old type strainer heads can now be made in less than a minute.





With the new clamp-type, quick opening NRM strainer head you can convert your present strainer equipment to this great time-saving feature, *and make other savings too.*

Send us a description of your strainer equipment and we will give you complete information on how you can convert to money-saving NRM strainer heads.

NATIONAL RUBBER MACHINERY CO.

General Offices: AKRON 8, OHIO

NRM

Creative Engineering

California Representative: Sam Kipp, P. O. Box 441, Pasadena 18, Calif.

HOW MANY rubber articles in this picture? That's a game you could play almost *anywhere*, for rubber is an ever-present part of our living. To adapt rubber for its varied applications, the rubber industry relies heavily upon chemicals, like CUMAR* resin, which are supplied by BARRETT.

This advertisement in The Saturday Evening Post features BARRETT Rubber Compounding Chemicals and shows the vital part played by the rubber industry in raising the American standard of living.

HOW BARRETT SERVES THE RUBBER INDUSTRY. BARRETT CUMAR* resin and more than a score of other BARRETT Rubber Compounding Materials are widely used by the rubber industry to impart desired degrees of hardness, softness, elasticity, wear resistance or other characteristics to natural, synthetic and reclaimed rubber. You benefit from their use in automobile tires and tubes, garden hose and rubber footwear, gloves, wire insulation, friction tape, adhesives and hundreds of other items in daily life. Helping American industry in basic ways has made Barrett **ONE OF AMERICA'S GREAT BASIC BUSINESSES.**

Barrett*

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

BARRETT RUBBER COMPOUNDING MATERIALS

CARBONEX* Rubber Softener and Extender...CARBONEX*S Rubber Softener and Extender...CUMAR* Paracoumarone-indene Resin... BARDOL* Rubber Compounding Oil...BARDOL*B Rubber Compounding Oil...DISPERSING OIL No. 10...B.R.H.* No. 2 Rubber Reclaiming Oil...B.R.S. No. 700 Rubber Softener...B.R.T.* No. 3 Rubber Reclaiming Oil and Saturant...B.R.T.* No. 4 Rubber Reclaiming Oil...B.R.T.* No. 7 Rubber Softener...B.R.V.* Rubber Softener...B.R.C.* No. 20 Rubber Plasticizer and Extender...RESIN "C"* Coal-tar Resin... DIBUTYL PHTHALATE...PHENOL...CRESYLIC ACID...BENZOL...TOLUOL...AMMONIA.

*Reg. U. S. Pat. Off.

UNIFORM · CONSISTENT · DEPENDABL

Spheron 9

compounderz long since
pend on the uniform
bot's Spheron 9. That's
sosts of this easy
channel carbon black in
laboratories make cer-
heron 9 meets the most
ifications. For resilience,
ld-up and tough resist-
Cabot's Spheron 9
the job.

CABOT

CABOT, INC. BOSTON 10, MASS.

"We have standardized on CLIMCO PROCESSING

• Many leading rubber firms have their liners Climco Processed because it speeds production by ending stock adhesions. Climco Processing insures perfect separation of stock and liner — saving time and reducing expensive stock losses.

INFORMATIVE, ILLUSTRATED BOOKLET ON REQUEST

Climco Processed Liners also increase the life of your liners, preserve the tackiness of the stock, help maintain gauges, enlarge latitude in compounding, eliminate lint and ravelings and facilitate horizontal storage.

Take advantage of our twenty-five years' experience in this field. Let Climco Processing help you get more efficient use from your liners.

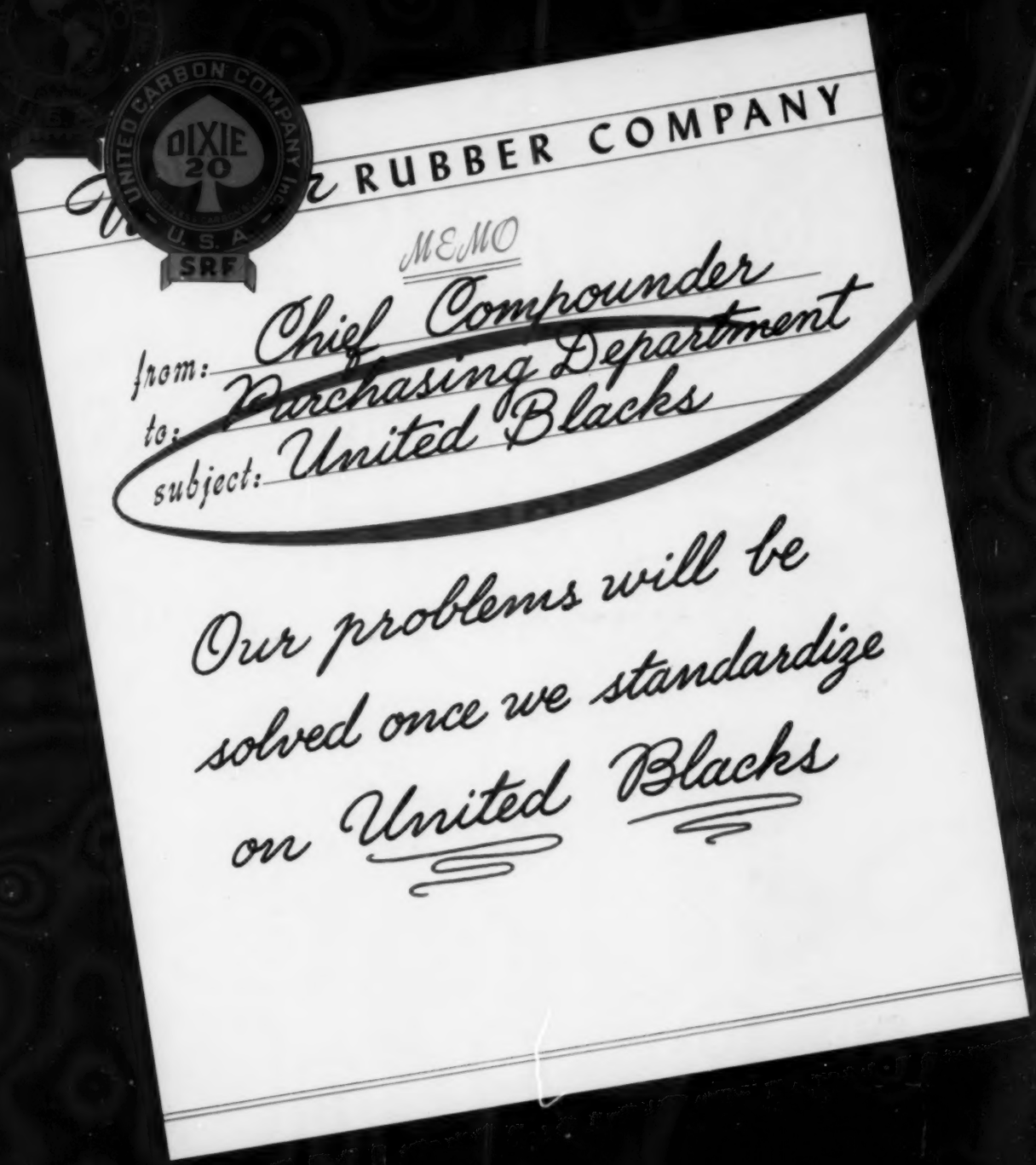
THE CLEVELAND LINER & MFG. CO.
5508 Maurice Avenue • Cleveland 4, Ohio, U. S. A.
Cable Address: "BLUELINER"

LINERETTE INTERLEAVING PAPER
Treatment Contains
NO OIL OR WAX
Samples on Request

CLIMCO
PROCESSED LINERS

Serving the Rubber Industry for 25 Years

SUBJECT: *United Blacks*



UNITED CARBON COMPANY, INC.

CHARLESTON 27, W. VA.

NEW YORK • AKRON • CHICAGO • BOSTON

SUBJECT: *United Blacks*

United blacks are known round the world for dependable quality and satisfactory performance.

United's mastery of channel and furnace black manufacture has created in their blacks that fine balancing of properties so conducive to good processing and sturdy wear.

United blacks are scientifically controlled, and therefore score high for uniformity.

United blacks meet all your specifications all the time.

Reach a high standard in your goods by standardizing on United blacks.

RESEARCH DIVISION

UNITED CARBON COMPANY, INC.

Charleston 27, West Virginia

PRODUCT CONTROL

A vital factor in the manufacture of high-quality Zn O

Partial view of the automatic and continuous weighing mechanism for the furnace charge. This charge, consisting of **accurately** proportioned amounts of sintered ore and coke, is fed into a pre-heater prior to smelting in our patented electro-thermic furnaces

"CLOSE CONTROL is exercised in every step of production." Applied to the manufacture of ST. JOE Lead-Free ZINC OXIDE, this assurance is taken for granted by consumers of our product—for they are familiar with its exceptional purity and uniformity. Compared to the highly complex equipment employed in our product-control laboratories, the weighing mechanism shown above may seem relatively simple. However, it is an important link in a long chain of control devices extending from our New York State zinc mines through our Josephtown, Pa., smelter. This unity of control—from ore to finished product—makes it possible to maintain the high standards of quality for which ST. JOE Lead-Free ZINC OXIDES are recognized throughout the consuming industries.

ST. JOSEPH LEAD COMPANY

250 PARK AVENUE • NEW YORK 17 • ELdorado 5-3200

Plant & Laboratory: Josephtown, Beaver County, Pennsylvania

ST. JOE Lead-Free **ZINC OXIDE**

4 KINDS OF EXTRUSION EXPERTS...

Each type of rubber extrusion machine produced by Farrel-Birmingham is an expert in its own field . . . a mechanized specialist in its particular sphere of operation in the rubber industry.

Into these units Farrel-Birmingham engineers have developed the most efficient applications of the single basic operating principle (mastication and extrusion by screw action) and have skillfully "designed in" the special features and construction to best suit each machine for its particular processing purpose.

For extrusion equipment of proven ability, built to provide maximum efficiency and long, trouble-free service . . . "experts" that will fit into your production picture of profitable operation . . . call on Farrel-Birmingham.

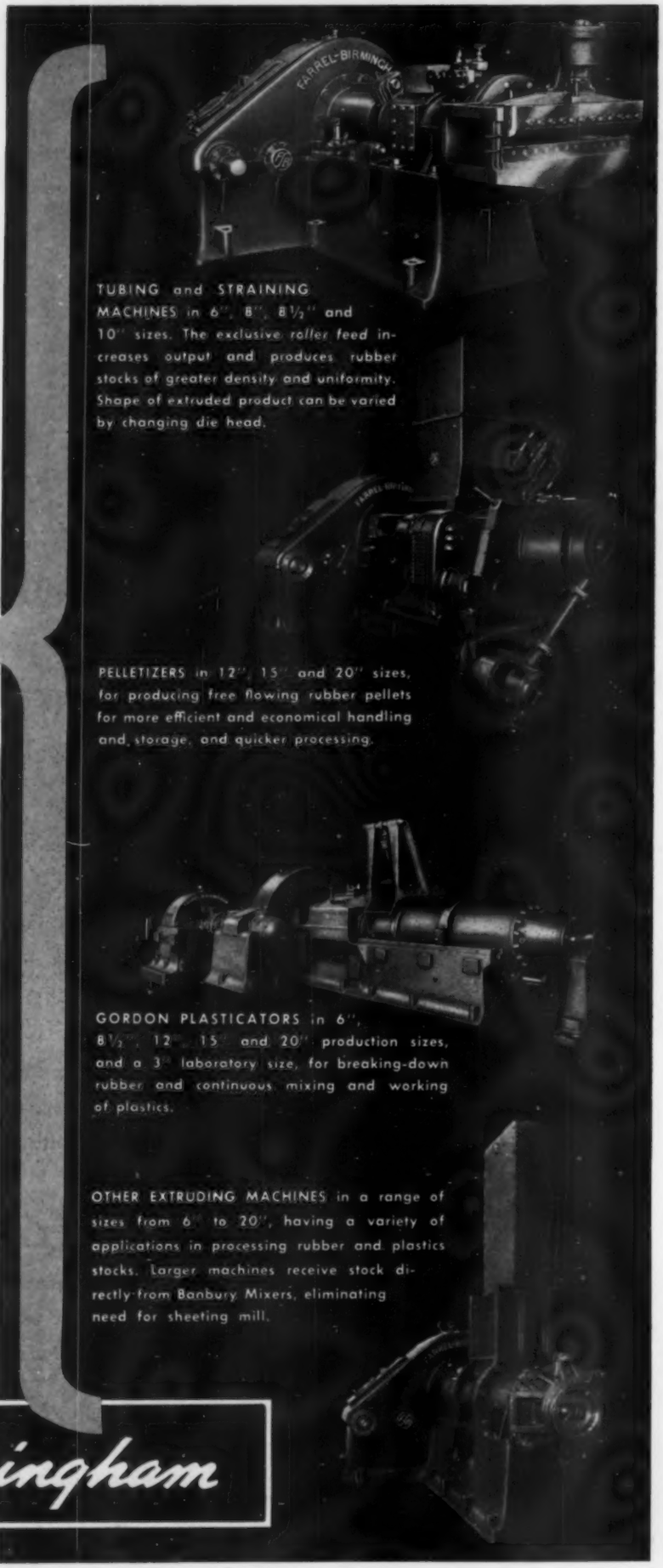
Further information about the machines illustrated or other F-B rubber processing equipment will be furnished on request.

FB-353

FARREL - BIRMINGHAM COMPANY, INC.
ANSONIA, CONN.

Plants: **Ansonia and Derby, Conn., Buffalo, N. Y.**

Sales Offices: **Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston.**



TUBING and STRAINING MACHINES in 6", 8", 8½" and 10" sizes. The exclusive *roller feed* increases output and produces rubber stocks of greater density and uniformity. Shape of extruded product can be varied by changing die head.

PELLETIZERS in 12", 15" and 20" sizes, for producing free flowing rubber pellets for more efficient and economical handling and storage, and quicker processing.

GORDON PLASTICATORS in 6", 8½", 12", 15" and 20" production sizes, and a 3" laboratory size, for breaking-down rubber and continuous mixing and working of plastics.

OTHER EXTRUDING MACHINES in a range of sizes from 6" to 20", having a variety of applications in processing rubber and plastics stocks. Larger machines receive stock directly from Banbury Mixers, eliminating need for sheeting mill.

Farrel-Birmingham

★ *A smooth, stable,* **DUSTLESS** *dispersion of* **ZINC STEARATE** *in water in concentrated form*

AQUAZINC

NO DUST . . . HEALTH INSURANCE FOR YOUR PERSONNEL

ATTENTION, manufacturers of milled stock, rubber compounds, molded goods, coated fabric and paper, Butyl rubber, latex and cements. Aquazinc is economical and efficient to use. It can be applied with uniformity and with no loss. It eliminates dust, inconvenience, fire hazard, and other difficulties accompanying the use of powdered Zinc Stearate.

AQUAZINC is particularly convenient for surface application of Zinc Stearate. When diluted with 8 to 20 parts of water, it can be applied by spray or bath.

THE BEACON COMPANY

PURITY · UNIFORMITY · DEPENDABILITY

Chemical Manufacturers

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In Canada: PRESCOTT & CO., REG'D., 774 ST. PAUL ST. W., MONTREAL

PELLETEX

Leading SRF Black

For

Non Cracking

Flexible

Long Wearing

RUBBER FOOTWEAR

MANUFACTURER	DISTRIBUTOR
GENERAL ATLAS CARBON CO.	HERRON BROS. and MEYER
PAMPA, TEXAS	NEW YORK, N. Y.
GUYMON, OKLA.	AKRON, OHIO

NOW — A SUPERIOR POSTWAR ANTIOXIDANT AT PREWAR PRICES

PDA-10

The Best Protection Against

- Heat Deterioration
- Flex Cracking
- Oxygen Aging

A COMPARISON OF ANTIOXIDANTS in a Natural Rubber Tread Type Recipe

	Compound No. 1915 A	Compound No. 1915 B	Compound No. 1915 C
No. 1 Smoked Sheet	100	100	100
EPC Black	50	50	50
Zinc Oxide	5	5	5
Sulfur	3	3	3
El-Sixty	0.45	0.45	0.45
Santocure	0.30	0.30	0.30
Resinex L-4	2	2	2
Stearic Acid	3	3	3
Phenyl-beta-Naphthylamine	...	...	1
PDA-10	...	1	...

The test specimens were cured at 287° and tested at RT before and after ageing 96 hours, Oxygen Bomb at 70° C–300 lbs.

UNAGED

	Time of Cure	Modulus at 300%	Ult. Tensile	Ult. Elong.
Compound No. 1915 A (Control)	30 min.	1200	3700	603
	40 min.	1330	3770	580
	60 min.	1540	3930	563
Compound No. 1915 B (1% PDA-10)	30 min.	1120	3840	623
	40 min.	1300	4150	620
	60 min.	1490	4210	610
Compound No. 1915 C (1% PBNA)	30 min.	1090	3690	620
	40 min.	1310	4030	613
	60 min.	1400	3980	607

AGED

Compound No. 1915 A (Control)	30 min.	730	660	287
	40 min.	....	500	200
	60 min.	....	550	210
Compound No. 1915 B (1% PDA-10)	30 min.	1200	2070	480
	40 min.	1360	2240	470
	60 min.	1490	2090	430
Compound No. 1915 C (1% PBNA)	30 min.	1110	1830	463
	40 min.	1270	1970	453
	60 min.	1350	1930	423

PRICE SCHEDULE

100 to 1,999 lbs.	$0.42 per lb.
2,000 to 9,999 lbs.	0.40 per lb.

CONTRACT PRICES for equal monthly or quarterly shipments.

10,000 to 29,999 lbs.	$0.39 per lb.
30,000 to 99,999 lbs.	0.38 per lb.
100,000 lbs. up	0.37 per lb.

Add 1c per lb. for West Coast.
Terms: 1–10 net 30. Freight allowed.

FOR TOP PERFORMANCE PER POUND AND FOR PREMIUM PERFORMANCE PER DOLLAR ALWAYS SPECIFY PDA-10

COUPON (Attach to Business Letterhead)
Benson Process Engineering Co., Eden, N.Y.

Please send sample to:—

NAME _____
TITLE _____
FIRM NAME _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

BENSON
PROCESS ENGINEERING CO.
Eden, N. Y.

POLY DIARYL AMINES

NATURAL LATEX
and
NATURAL LATEX
COMPOUNDS
Available from
Private Stock
Your Inquiries Solicited
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Sales Representatives:
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304 West 42nd Street, New York City
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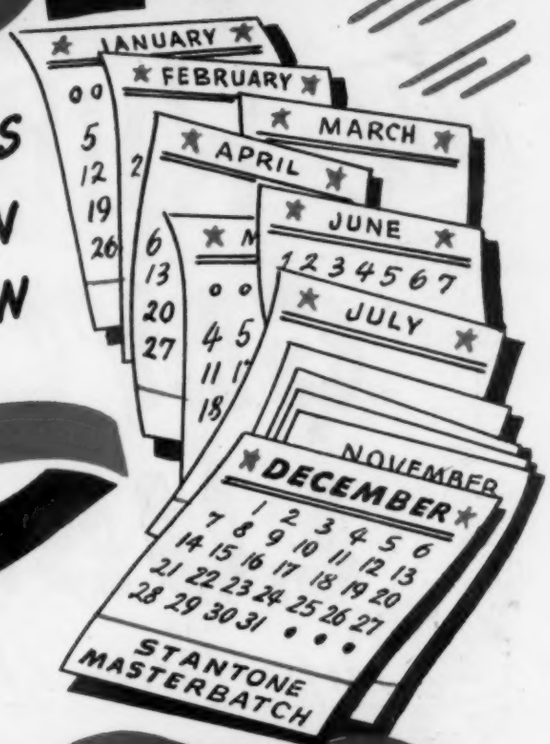
STANTONE MASTERBATCH COLORS

Complete RANGE OF COLORS
Always THE SAME IN
COLOR INTENSITY YEAR IN
AND YEAR OUT....



STANTONE MASTERBATCH presents compounding colors in a new way . . . Concentrated color dispersed in a quickly compatible thermo-plastic medium — standardized in color intensity. With STANTONE MASTERBATCH finished products never vary in color density or hue. Mills may be changed from one color batch to another without intermediate cleaning . . . STANTONE MASTERBATCH Colors save costly experimentation, so often necessary with dry pigments due to natural variations in color intensity. STANTONE MASTERBATCH Colors make color compounding mathematically accurate in matching correct color specifications . . . Many manufacturers today are adopting STANTONE MASTERBATCH COLORS for better coloring, greater color-compounding efficiency and economy.

A complete range of colors are now available in MASTERBATCH or dry pigment form . . . Write for complete data on color compounding with STANTONE COLORS — for Rubber and Plastics.

HARWICK STANDARD CHEMICAL CO.
AKRON 8, OHIO
Branches: Boston . . . Trenton . . . Chicago . . . Los Angeles

A Boon to the RUBBER MAKER

GLYCERIZED LUBRICANT

(LIQUID CONCENTRATE)

Superlative Dip

for hot rubber slabs to prevent adhesion when piled . . . banishes dust nuisance by replacing soapstone, talc . . . prevents sticking during cure of extrusions, tubing when coiled on flat pan . . . excellent lubricant for molds, mandrels, air bags, belt drums, etc. . . . washing, finishing inner tubes, etc.; imparts satiny finish . . . ideal for processing insulated wire, cable . . . truly versatile lubricant for natural, reclaim or synthetic rubbers.

MADE BY THE MAKERS OF
RUBBEROL AND **SYNTHOL**

GET THE GENUINE *from* GENSEKE

AVAILABLE ONLY IN DRUMS, HALF DRUMS AND QUARTER DRUMS

QUALITY SINCE 1884

GENSEKE BROTHERS

RUBBER MATERIALS DIVISION

West 48th Place and Whipple Street — Chicago 32, U.S.A.

HAVE YOU TRIED -

INDONEX

REG. U.S. PAT. OFF.

plasticizers

As partial substitutes for ester plasticizers in Hycar

Hycar OR-15	100	100	100
SRF Black	40	75	100
ZnO	5	5	5
Stearic acid	1	1	1
Benzothiazyl disulfide	1.5	1.5	1.5
Sulfur	2	1.5	1.5
Dibutyl phthalate	30	15	15
"INDONEX" 634½	20	10	10
Agerite Resin D	2	2	2
Heliozone	2	2	2
	203.5	213.0	238.0
Hardness (50 min. cure 316°F.)	40	55	64

- These compounds show good plasticization and compatibility. Their general properties and oil resistance are suitable for many applications. The two harder compounds are suitable for extrusion. Circular No. 13-14 gives detailed results.

✔ Check the circulars you want and clip the list to your letterhead. Mail to:

STANDARD OIL COMPANY (INDIANA)

Chemical Products Department

910 South Michigan Avenue **Chicago 80, Illinois**

General results obtainable with "INDONEX" Plasticizers in natural and synthetic rubbers have been described in our Bulletin No. 13, while various other specific applications of "INDONEX" are discussed in the following Circulars:

☐ 13-1—Butyl Rubber Compounds ☐ 13-2—Butadiene-Acrylonitrile Copolymer Compounds ☐ 13-3—Neoprene Compounds
☐ 13-4—Tire Carcass Compounds ☐ 13-5—Footwear & Heel Compounds
☐ 13-6—Camel Back ☐ 13-7—Motor Mount & Bumper Compounds
☐ 13-8—Wire Jacket and other Extruded Compounds ☐ 13-9—GR-S Packing Compounds
☐ 13-10—Hose Compounds ☐ 13-11—Hard Rubber Compounds
☐ 13-12—Low Hardness Mechanical Goods ☐ 13-13—Neoprene Mechanical Goods

INDOIL CHEMICAL PRODUCTS

Announcement

• We beg to announce that MOORE & MUNGER have changed the name of their Clay Department to P. W. MARTIN GORDON CLAYS, INC., which incorporation took effect as of August 1st, 1947.

• With this incorporation, there has been no change in the personnel or any change in their sales policy or products for the sale of BUCA, CATALPO, PIGMENT 33, WHITETEX, AND SYNTHETIC 100 (Polyisobutylene produced by Standard Oil Co. of New Jersey)

• Our Mr. E. W. Schwartz will be technical sales representative as formerly along with Mr. W. H. Shields.

• We hope to have your continued use of our products.

P. W. MARTIN GORDON CLAYS

INCORPORATED

33 RECTOR STREET, NEW YORK 6, N. Y.

SUCCESSOR TO MOORE & MUNGER'S DOMESTIC CLAYS DEPARTMENT

R. D. WOOD 3400-TON TWO-OPENING PLATEN PRESS

For

VULCANIZING and CURING
RUBBER COMPOSITION SHEET PACKING,
FLOOR TILE, and RUBBER BELTING

Newest member of the R. D. Wood "Press Family" is this Two-Opening Multiple Cylinder Type Hydraulic Steam Platen Press. Designed for vulcanizing and curing rubber composition sheet packing, or floor tile; also, with the addition of stretching and clamping units, adaptable for vulcanizing rubber belting.

Top and bottom platen members are of sectional construction. The one-piece moving platen is made from open hearth steel casting, with movement guided to assure the proper adjustment to compensate for expansion and contraction under changing temperatures. Intermediate steam platen is column guided, suspended by means of steel hanger rods, and accurately spaced with press in open position. Various press sizes and capacities can be furnished to meet product requirements. If you want more details, or engineering advice, ask R. D. WOOD COMPANY, Independence Square, Philadelphia 5, Pa.

HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE • ACCUMULATORS • ALLEVIATORS • INTENSIFIERS

R.D. Wood Company
EST. 1803

A Reminder to SUPPLIERS to Order Their Copy of the 1947 RUBBER RED BOOK Now!

Many suppliers to the rubber industry, including their Branch Offices and Sales Agents, were disappointed because they were unable to buy a copy of the last issue (1945 edition) of the RUBBER RED BOOK when the supply became exhausted a few weeks after publication.

We suggest therefore, that suppliers who want to make sure of getting one or more copies of the new 1947 issue (see announcement on opposite page) enter their order *now.*

The RUBBER RED BOOK is invaluable to the sales staffs of firms selling to the rubber industry. Nowhere else can you obtain such a complete and accurate list of rubber manufacturers in the United States and Canada, arranged both alphabetically and geographically, with such additional data as number of employees, date established, telephone number, executive, technical and purchasing personnel, and the types of rubber products made.

In addition the book includes lists of suppliers of all materials, equipment and services used by rubber manufacturers—and a Who's Who Section of over 9000 names of individuals connected with the rubber industry.

It's a big book of 840 pages packed full of data which has made it indispensable to rubber manufacturers and suppliers alike! The supply of the 1947 issue is not expected to last long and to insure getting your copy, we suggest you send in your order today.

Price: $5.00 (postpaid)

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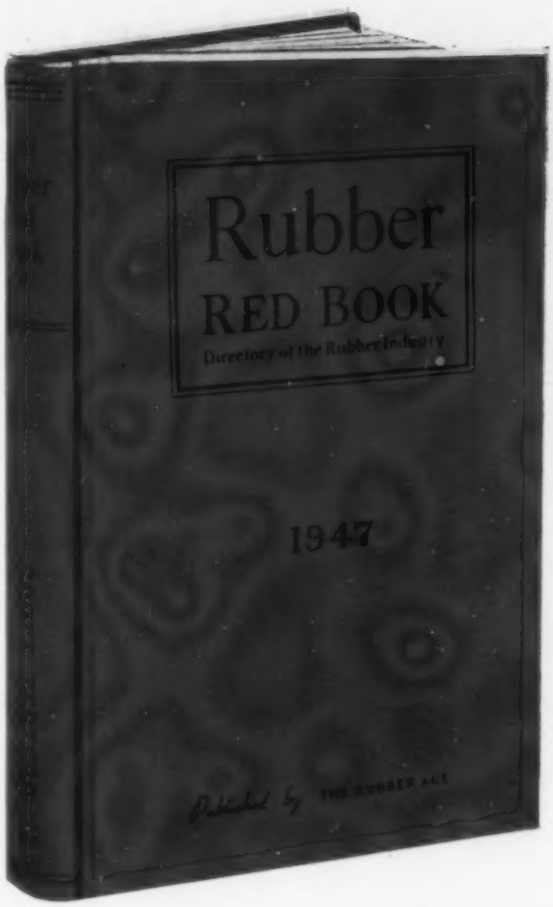
Send Orders to:

RUBBER AGE

250 West 57th St., New York 19, N. Y.

Now Available!

1947 RUBBER RED BOOK



The most indispensable and widely used book in the rubber industry—invaluable as a source of information for rubber manufacturers, suppliers and all others interested in the rubber manufacturing field.

1947 Issue
Sixth Edition — 840 Pages
Cloth Bound
Price: $5.00 postpaid

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To avoid disappointment we suggest that you send in your order TODAY as the supply is limited and is not expected to last long.

Summary of Contents
1947 RUBBER RED BOOK

RUBBER MANUFACTURERS IN U. S. (Total, 1010)
Classified Alphabetically, Geographically and by Types of Rubber Products.

RUBBER MANUFACTURERS IN CANADA (Total, 67)

RUBBER MACHINERY AND EQUIPMENT
Classified List; Manufacturers and Addresses.

ACCESSORIES AND FITTINGS
Classified List; Manufacturers and Addresses.

RUBBER CHEMICALS AND COMPOUNDING MATERIALS
Classified List; Trade and Brand Names; Suppliers and Addresses.

FABRICS AND TEXTILES
Classified List; Suppliers and Addresses.

NATURAL RUBBER AND RELATED MATERIALS
Classified List; Suppliers and Addresses; "Official Crude Rubber Type Descriptions."

SYNTHETIC RUBBER AND OTHER RUBBER-LIKE MATERIALS

RECLAIMED RUBBER
Manufacturers and Addresses; Brand Names; Classifications.

SCRAP RUBBER DEALERS

RUBBER LATEX
Latex and Latex Compounds; Water Dispersions; Miscellaneous; Latex Compounding Materials; Latex Machinery & Equipment; Suppliers and Addresses.

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TECHNICAL JOURNALS

TRADE AND TECHNICAL ORGANIZATIONS

WHO'S WHO IN THE RUBBER INDUSTRY (Over 9000 Names)

SUBJECT INDEX

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From Tires for Wheels

...to Rubber Heels

Dutch Boy: 'Many different rubber products have one thing in common. They're better made with Red Lead."

Manufacturer: "But just what does Red Lead do?"

Dutch Boy: "It gives the seven advantages I've listed at right. Look them over."

Manufacturer: "But do I get all seven, no matter what I make?"

Dutch Boy: "With tires, all seven advantages are yours—but most of them apply with other products, too."

Manufacturer: "No matter what my base is?"

Dutch Boy: "Whether the base is GR-S, GR-S-10, GR-M, GR-A or GR-I. Just let us know your specific application and our technical staff will gladly supply literature and any other information you need. Drop a line to the Rubber Division of our Research Laboratories, 105 York St., Brooklyn 1, N. Y."

PLENTY OF REASONS FOR COMPOUNDING RUBBER WITH #2 RM Rx RED LEAD

1. *Improved Heat Stability—Retention of Elasticity*
2. *Lower Heat Build-up—Cooler Running*
3. *Economical*
4. *Faster Curing Rate*
5. *Extended Curing Range*
6. *Excellent General Physical Properties*
7. *Safe Processing*

NATIONAL LEAD COMPANY—New York 6; Buffalo 3; Chicago 8; Cincinnati 3; Cleveland 13; St. Louis 1; San Francisco 10; Boston 6, (National Lead Co. of Mass.); Philadelphia 7, (John T. Lewis & Bros. Co.); Pittsburgh 30, (National Lead Co. of Pa.); Charleston 25, West Virginia, (Evans Lead Division).

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FROM EVERY ANGLE...
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Look to Pequanoc
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RUBBER RECLAIMS

Another New

PEQUANOC RECLAIM No. 5800
FROM SYNTHETIC TIRE PARTS

This is a smooth low gravity high tensile tubing reclaim.

It is well adapted for calendered stocks.

It is available in adequate quantities.

Reg. U. S. Pat. Off.

Write for sample, complete specifications, and price list.

A FEW OF OUR OTHER STANDARDS

- No. 3600
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- Aurora
- Champion
- Eclipse
- Imperial
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- Mustang
- Neutrex
- Planet
- Red Star
- Ruby
- Tomahawk

Send for full data concerning these named reclaims for specific applications.

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SELENIUM DIETHYL DITHIOCARBAMATE

PROPERTIES

Appearance	Yellow Powder
Odor	Characteristic
Specific Gravity @ 20°/4°C.	1.32
Melting Point (approx.)	62°C.
Storage Stability	Excellent
Staining	Non-staining and non-discoloring

USES

AS A: Primary Accelerator
Secondary Accelerator
Vulcanizing Agent

IN: Continuous cure wire insulation
Heat-resistant mechanical goods

WITH: Natural Rubber
Styrene Rubber
Butyl Rubber

Visit Sharples Booth No. 25 at the Exposition of Chemical Industries, Grand Central Palace, N. Y., Dec. 1st to 6th

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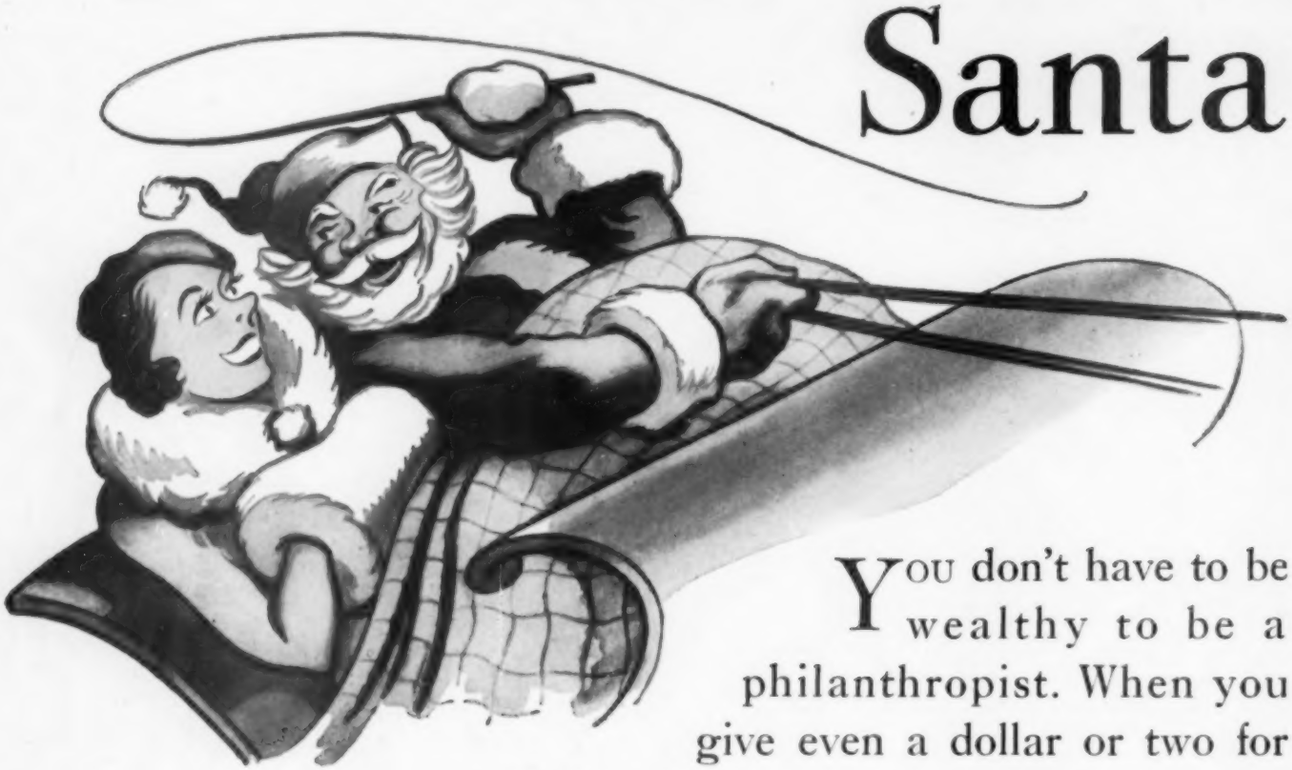
SHARPLES CHEMICALS INC. PHILADELPHIA • NEW YORK • CHICAGO • AKRON

How to ride with Santa



You don't have to be wealthy to be a philanthropist. When you give even a dollar or two for Christmas Seals, you give the greatest gift of all—health, even life itself.

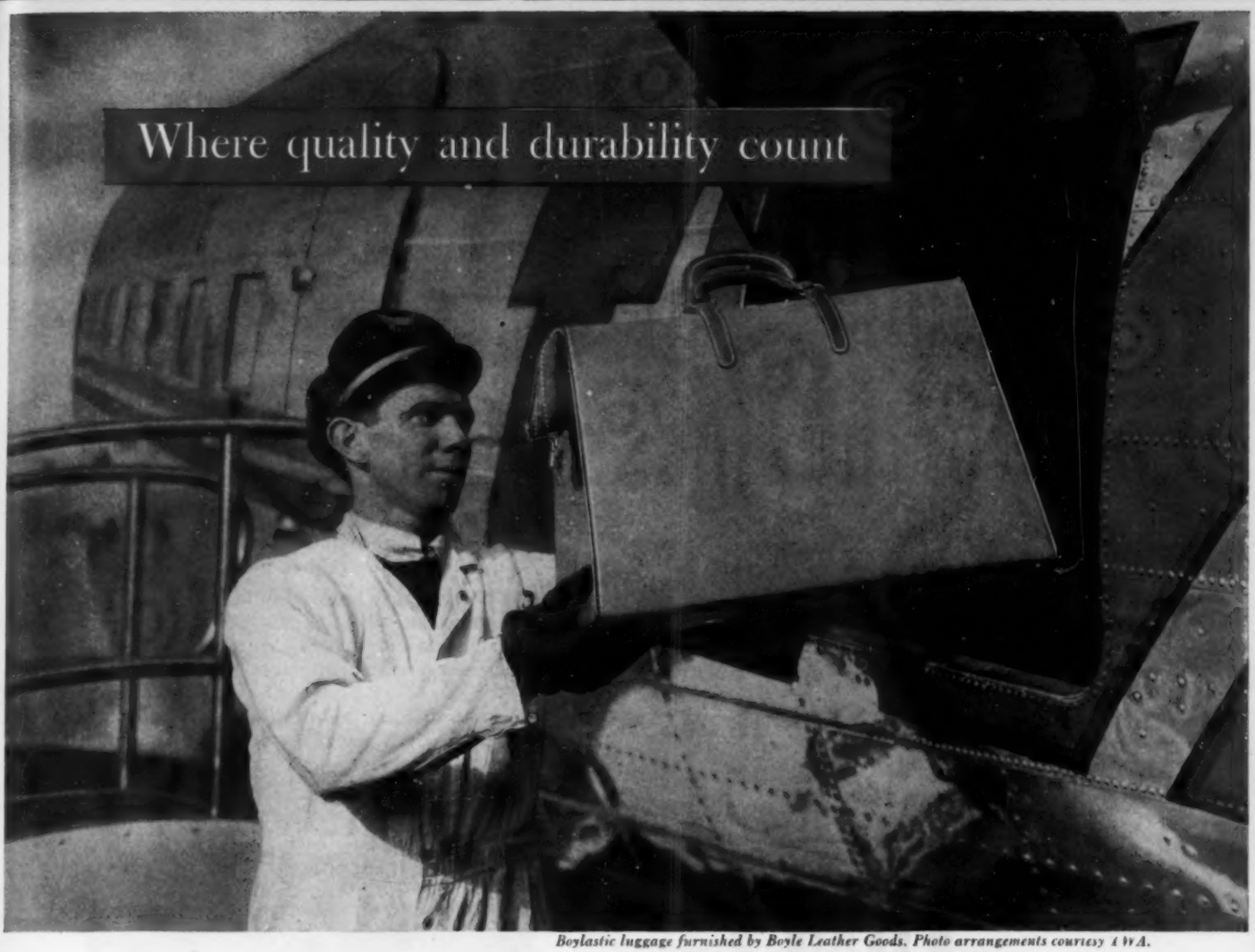
Christmas Seal funds make possible year-round help against tuberculosis — the dread TB that threatens more people between 15 and 44 than any other disease.

Add Christmas Seals to your Christmas giving. Let Santa's every letter, every package carry the Seal that saves lives. Send in your contribution today.

BUY CHRISTMAS SEALS

Because of the importance of the above message, this space has been contributed by

THE RUBBER AGE



Boylastic luggage furnished by Boyle Leather Goods. Photo arrangements courtesy AWA.

–specify Paraplex G-25 and G-40 for plasticizing vinyl compounds

If you are making vinyl compounds where quality is the keynote . . . turn to Resinous Products!

In such applications as vinyl compounds for luggage, PARAPLEX G-25 and G-40 offer outstanding permanence. These resinous plasticizers are non-extractible, non-migratable . . . stable at high temperature . . . impart low temperature flexibility . . . are not affected by long exposure to sunlight and weathering.

Even more important, these unique plasticizers put an end to lacquer-lifting! That's a point you can't afford to overlook — particularly if you are making free films for luggage or other applications.

In addition to the PARAPLEX polymeric plasticizers, there's a series of MONOPLEX esters to meet specialized requirements. If you are working with vinyl compounds, we'll be glad to work with you in selecting suitable plasticizers.

PARAPLEX *is a trade-mark, Reg. U. S. Pat. Off.*

Represented by Cia. Rohm y Haas, S.R.L., Carlos Pellegrini 331, Buenos Aires, Argentina, and agents in principal South American cities.

THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

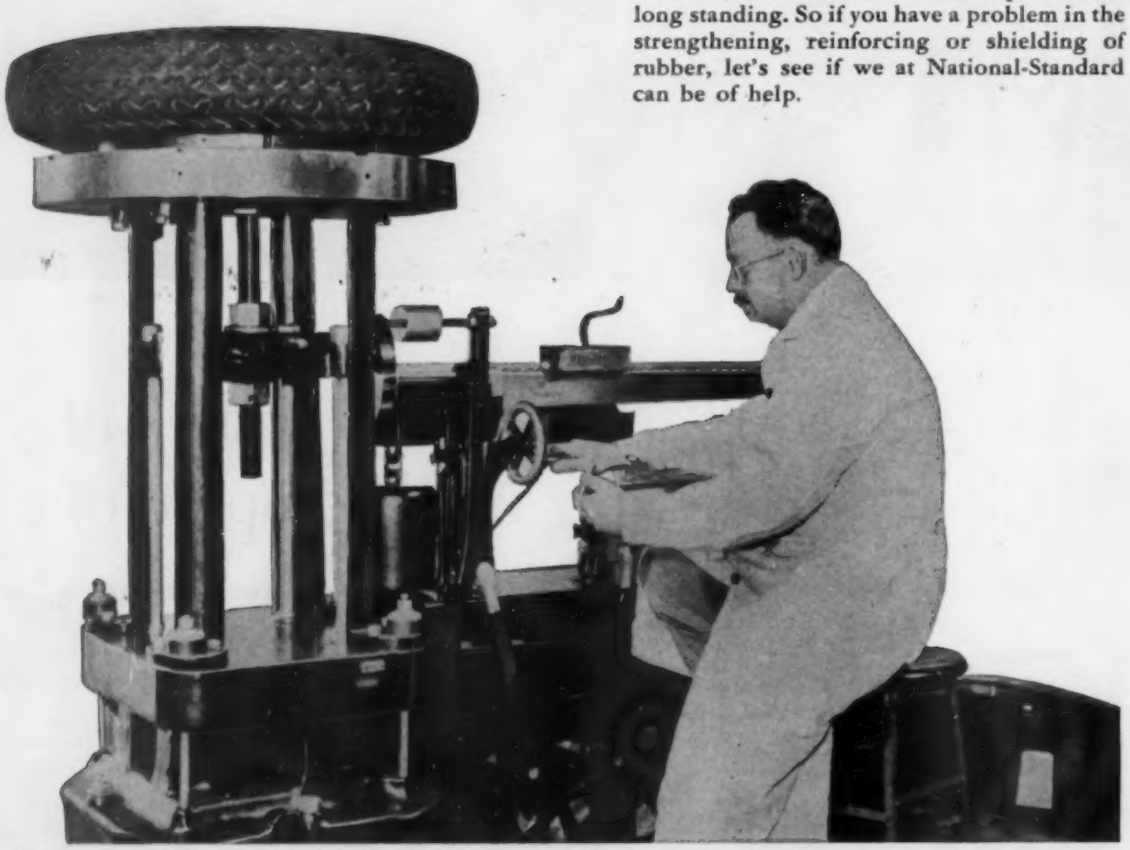
Failure that's good for business

TO remove the guesswork in tire building is good business . . . is good *for* business. And here is a machine that helps.

This special unit puts ever-increasing pressure on tire beads until they *fail,* permitting an exacting study of strength and elongation. It makes possible a comparison of constructions that may save you time and expense in long and delayed testing. It can also help you determine if materials are being used with maximum effectiveness.

Here at National-Standard, where we specialize in fabricated wires for tires and *all* wire-in-rubber products, this special tester is only one of our many types of special research and testing equipment. These extensive laboratory facilities, constantly at work, serve a two-fold purpose: to further the quality and usefulness of wire in rubber, and to help solve the problems of our friends and customers throughout the rubber industry.

As you may know, whole-hearted cooperation to the full extent of our broad experience, facilities and special skills, with no strings attached, is a National-Standard practice of long standing. So if you have a problem in the strengthening, reinforcing or shielding of rubber, let's see if we at National-Standard can be of help.



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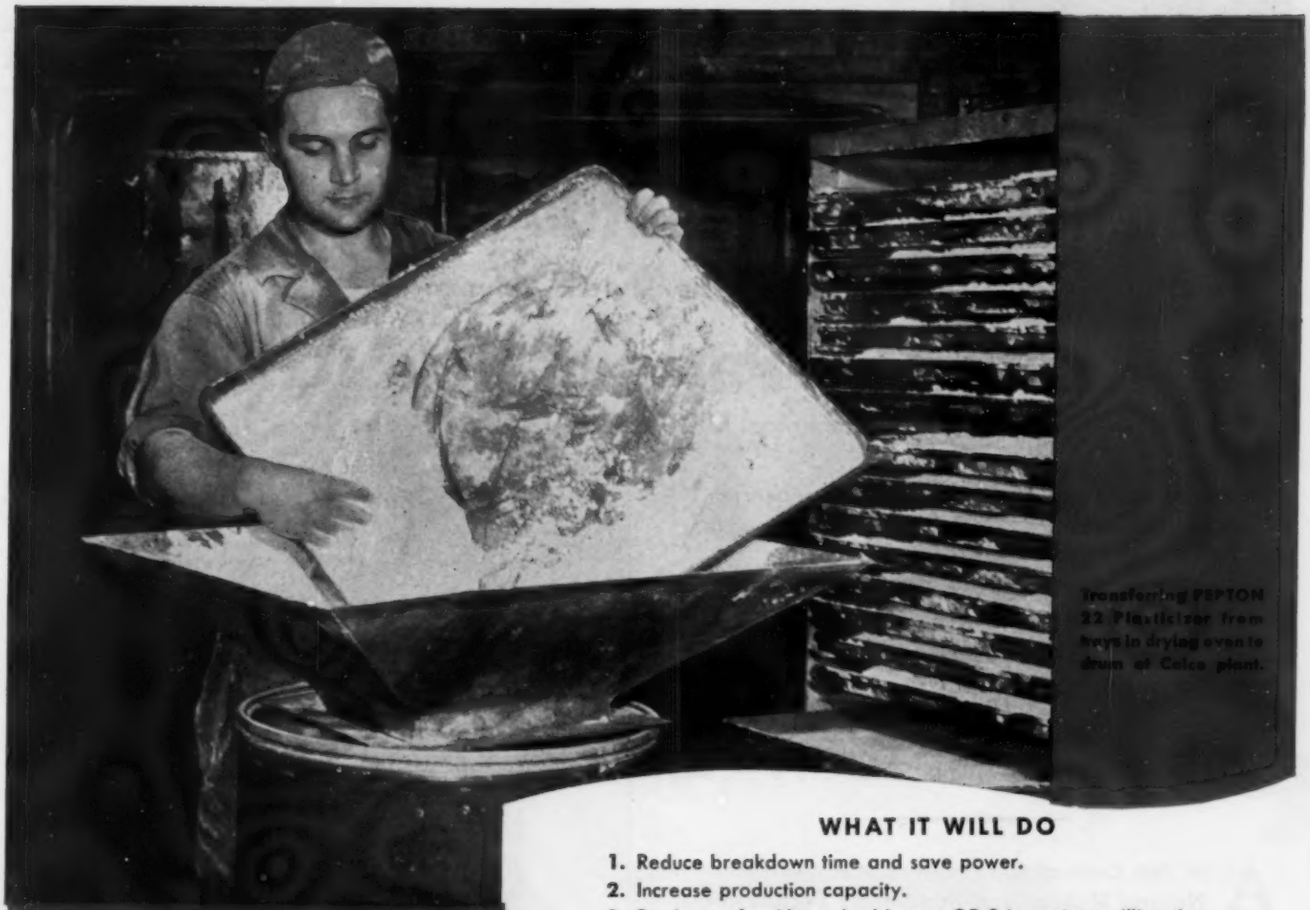


Transferring PEPTON 22 Plasticizer from trays in drying oven to drum at Calco plant.

PEPTON*22
PLASTICIZER

WHAT IT WILL DO

1. Reduce breakdown time and save power.
2. Increase production capacity.
3. Produce softer Natural rubber or GR-S in a given milling time.
4. Produce soft GR-S with plasticities which show no appreciable change on standing.
5. Control GR-S gel build-up in hot processing.
6. Plasticize reclaimed rubber, mixtures of reclaimed rubber and Natural rubber or GR-S, and also mixtures of Natural rubber and GR-S.
7. Produce softer or more plastic Natural rubber or GR-S mixed stocks in direct mixing.
8. Reduce heat developed in processing and thereby lower the processing temperatures.
9. Improve processing qualities and reduce rejects.
10. Give good physical properties.

Excellent for Sponge Rubber

WHAT IT WILL NOT DO

1. It will *not* produce dermatitis or toxic effects.
2. It will *not* discolor white or light-colored stocks.
3. It will *not* bloom.
4. It will *not* affect aging adversely.

PEPTON 22 Plasticizer, now available in pilot plant quantities, can be supplied in unlimited quantities effective January 1, 1948.

SALES REPRESENTATIVES AND WAREHOUSE STOCKS: Akron Chemical Company, Akron, Ohio • Ernest Jacoby & Company, Boston, Mass. • Herron & Meyer of Chicago, Chicago, Ill. • H. M. Royal, Inc., Los Angeles, Calif. • H. M. Royal, Inc., Trenton, N. J. • in Canada: St. Lawrence Chemical Company, Ltd., Montreal and Toronto

*Reg. U. S. Pat. Off.

Calco

RUBBER CHEMICALS DEPARTMENT

CALCO CHEMICAL DIVISION

AMERICAN CYANAMID COMPANY

BOUND BROOK, NEW JERSEY

Technical Bulletin No. 38 — on the Compounding of GR-S with Substantial Loadings of ZINC OXIDE

Blends of Natural Rubber and X-141

(The Isoprene/Styrene Polymer)

with 100 Parts of Zinc Oxide

(Refer to Technical Bulletins Nos. 24, 25, 27 and 34)

The following compounds were mixed separately under the same conditions, as far as possible:

COMPOUNDS 38 - 38A

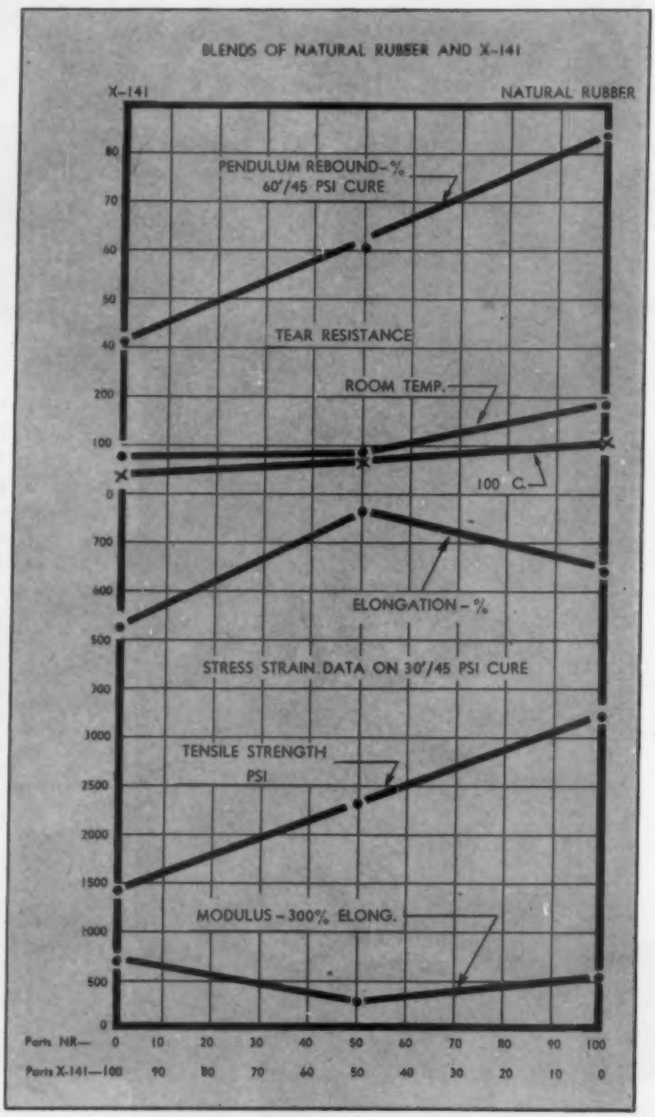
NATURAL RUBBER		X-141	
Smoked Sheet	100.0	X-141	100.0
Sulfur	3.0	Sulfur	3.5
MBT	1.0	MBT	2.0
"Agerite" Powder	1.0	Coumarone-indene Resin	7.5
Stearic Acid	3.0	E.L.C. Magnesia	5.0
ZINC OXIDE	100.0	ZINC OXIDE	100.0

AS IN THE CASE of the previous study of blends of Natural Rubber and Synthetic (Technical Bulletin No. 34), the stocks were allowed to stand overnight, warmed up on separate mills the following day to approximately the same plasticity, and sheeted off thin. The required amounts for the blend were plied up and mixed thoroughly.

As might be anticipated from its composition, X-141 is more compatible with Natural Rubber than with GR-S-10 and the tensile, tear and rebound properties follow the mixture law quite closely.

The elongation of the blend is higher than that of the components, and the modulus is correspondingly low. The permanent set of the blend is also higher than that of the constituents.

Possibly the over-all fatty acid content is too high. The effect of eliminating stearic acid from the Natural Rubber compound is under investigation. Further work is being carried out using an accelerator combination which permits the elimination of E.L.C. magnesia and coumarone-indene resin.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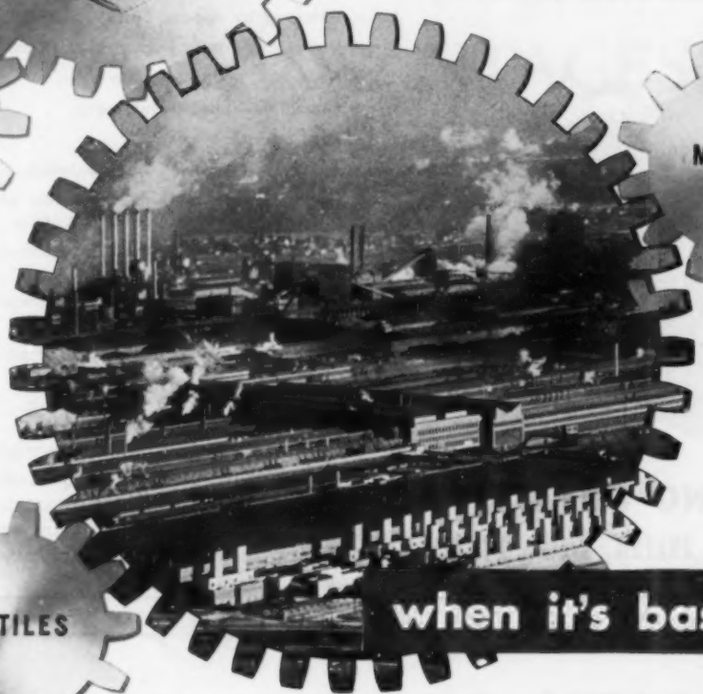

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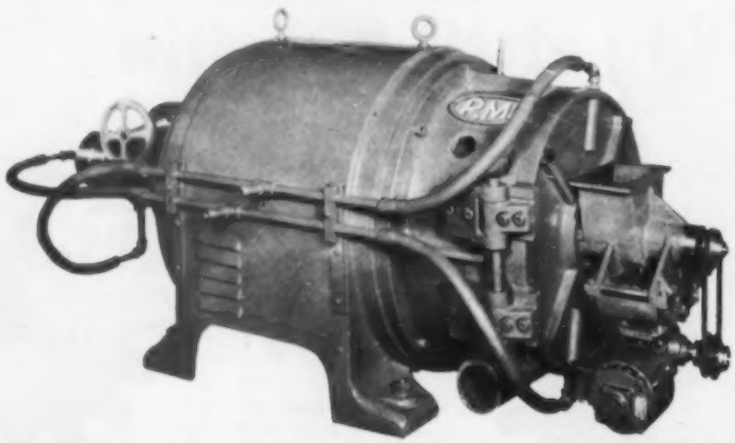

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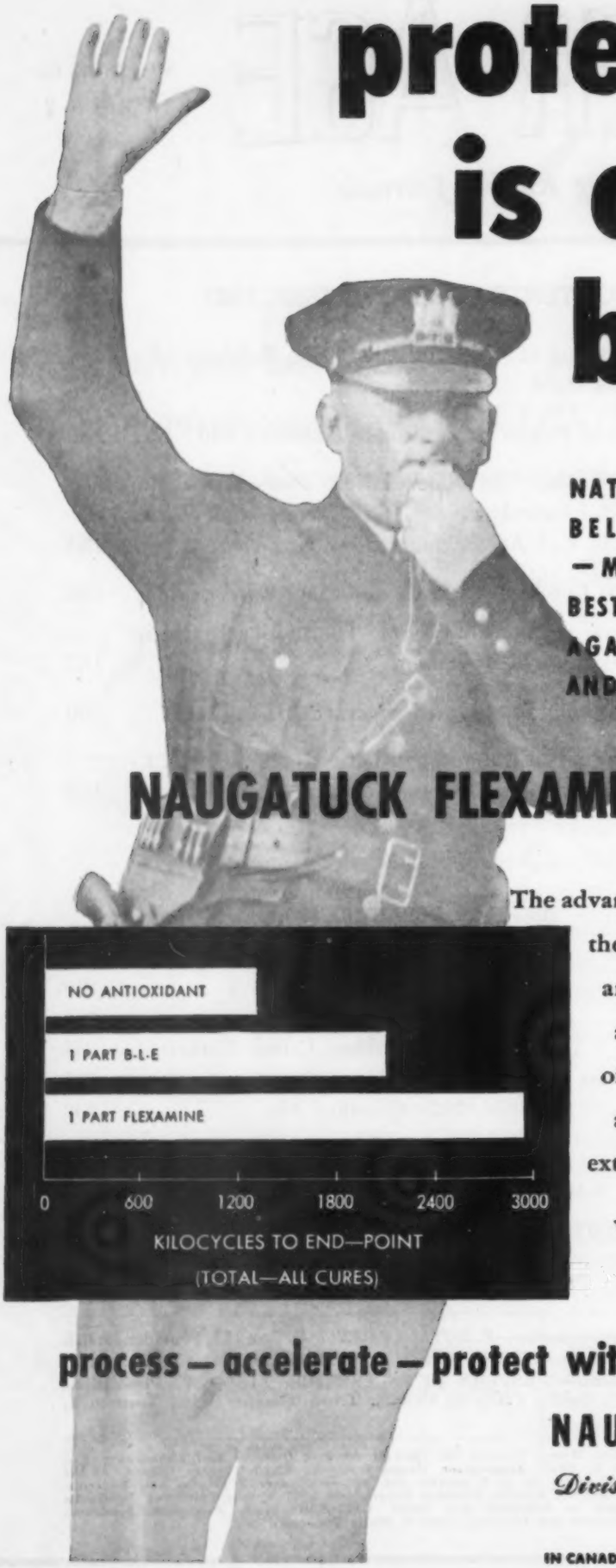

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RUBBER AGE

Vol. 62, No. 2 NOVEMBER, 1947

Testing and Grading of Wild and Plantation Rubbers

By NORMAN BEKKEDAHL

Rubber Section, National Bureau of Standards, Washington, D. C.

IN a search through the great number of papers in the scientific journals dealing with plantation and wild rubbers,* one comes to the conclusion that the rubber technologists concerned with manufacturing operations would much prefer to purchase their natural rubber on the basis of specifications set up by scientific laboratory tests than from the results of the past and present-day methods of evaluation solely by superficial appearance.

Ever since the beginning of the rubber industry, the natural rubber broker has purchased crude rubber from the producer and sold it to the manufacturer on the basis of cleanliness and a few other rule-of-thumb tests or observations. This is a very peculiar situation because practically all of the other ingredients used in the manufacture of rubber products are purchased on the basis of specifications which are dependent on scientific laboratory tests. Also the final rubber products are usually sold on a performance or quality basis rather than on appearance alone. Except for cleanliness, the superficial appearance of a crude rubber has very little in common either with the intrinsic quality of the crude rubber or with the quality of the product made from it. Practically all uses for rubber are for products in the vulcanized state, so why should not the manufacturer be interested in purchasing his crude rubber on the basis of tests made on its vulcanizate?

The present method of evaluating rubber on superficial appearance alone is, however, not altogether unwarranted or unsound. It involves an extremely simple and rapid procedure and does not require an expensive laboratory and scientifically-trained personnel. It operates on the assumption that if the crude rubber is clean, uniform in color, bubble-free, "rust"-free, and free from fungus formations, it probably has had extreme care in its preparation and will therefore exhibit its optimum physical and chemical properties. This assumption, however, obviously does not always hold true.

Cleanliness, under the present system of grading, is the most important factor and must, of course, remain important under any system of evaluation. Inner tubes and many similar articles require a crude rubber of the highest purity because the presence of any small particles of foreign material may be the starting point of a rupture. Extreme cleanliness in the crude rubber, however, may not be too important for the preparation of many articles, including tire casings *(22, 34)*, as can be seen from the large quantities of lower-grade rubber ordinarily used. Cleanliness of smoked sheet and thin crepes can usually be evaluated by visual examination, but for thick crepes and many of the forms of wild rubbers, such as balls, slabs, etc., some test other than visual observation must be substituted. There is reported to be no correlation between the color of a crude rubber and its properties, such as viscosity, rate of cure, and hardness *(11)*. The presence of gas bubbles inside the sheet or of "rust" on the surface of the smoked sheet seems to have no detrimental effects on the quality of the rubber *(5, 18, 22, 43)*.

Manufacturers of rubber products have frequently complained about the great variability among different lots of the same grade of rubber as evaluated by superficial examination. This variability is reported to be very high *(4)*, even up to 100 per cent or more *(35)*, in certain important characteristics such as rate of cure. Some authors, writing on the variability existing within

---

Note: This paper was presented at the "Symposium on Rubber Testing" held by A.S.T.M. Committee D-11 at Atlantic City, N. J., on June 19, 1947. It will be included in a special booklet containing all of the papers presented at the symposium to be issued in the near future by the American Society for Testing Materials.

* The term "plantation rubber" as used in this paper means all rubber produced by trees which have been planted by men and are under cultivation. Natural rubber obtained from all other trees, shrubs, vines, etc., is called "wild rubber." Large plantations, which are generally foreign-owned and operated, are known as estates and produce "estate rubber." Small tracts of cultivated rubber, usually owned and operated by the natives, produce "native rubber."

like grades of plantation rubber *(5, 36, 39, 40)*, have expressed the view that the present method of grading rubber should be done away with completely in favor of specifications based on laboratory tests.

The producers of crude rubber have at all times expressed not only a willingness but also a desire to try to produce the quality of rubber which would come closer to the manufacturer's ideal. However, the various manufacturers have thus far been unable to agree on the properties desired in the rubber and under the present system of evaluating rubber the plantations are practically forced to meet the requirements of the rubber broker who himself is not fundamentally concerned with the intrinsic value of the rubber *(5, 17, 22, 31)*. Except by direct contact with some plantation which is willing to cooperate, there seems to be no way by which a rubber consumer is able to buy rubber graded according to some properties important in his manufacturing operations.

At the suggestion of Edgar Rhodes, then with the Rubber Research Institute of Malaya, the Chairman of the Division of Rubber Chemistry of the American Chemical Society in April, 1935, appointed a Crude Rubber Committee, the function of which is "to promote a better understanding between producers and consumers of crude rubber and to act as a clearing house between the two groups for information on the quality requirements for various crude rubbers, including latex" *(10, 11)*. Another Crude Rubber Committee was then set up in the Far East for the purpose of cooperating with the one in America.

The committee in the United States does not have as part of its functions the setting up of specifications by which rubber should be purchased *(12)*. It is, however, in agreement with the general principle of setting up limits for the standardization of rubber *(11)*. Its chief duty is to develop and standardize methods for the testing of crude rubber. This committee has done much excellent work, which has been published in the form of progress reports *(10, 11, 12, 13, 14, 15)* on such subjects as crude rubber testing formulas, procedures for the analytical determination of copper and manganese, latex procedures, determination of cleanliness of rubber, plasticity, packaging of rubber, sampling for test purposes, age resistance, water-absorption tests, wild rubber testing, etc. The work of the committee was, of course, interrupted during the war years, but it has now been resumed.

There has always been a demand for some of the better grades of wild rubber. A very small amount of the poorer grades may in normal times be used for special purposes, but they are used in any appreciable quantity only in times of shortages of the better grades. It is only for emergencies such as this that a system of quality classification for the wild rubbers has much application. Although, as has previously been mentioned, there is a great variation within like-grades of plantation rubber, this variation is quite small as compared with that found among various classifications of wild rubbers. For this reason it is thought advisable, at least temporarily, to set up a system of classification of the plantation rubbers different from that of the wild rubbers. The tests to be made on all types of rubber prior to classification are, however, in most cases the same.

Methods of Testing

Most of the laboratory tests used in evaluating the quality of a crude rubber are applicable both to plantation rubber and to the wild rubbers. For certain tests, however, it is necessary to bring in some modifications because of the different characteristics of the two types of rubber. Suggested methods of test are described here, particularly those which have been applied at the National Bureau of Standards. They have been taken from procedures suggested in the literature as far as possible and augmented or changed where necessary.

Shrinkage

"Shrinkage" is the loss of weight resulting from washing the rubber free from washable foreign material and drying the resulting crepe. This loss of weight may be due to *(a)* solid material, such as sand, bark, etc., *(b)* water-soluble material in small amounts, and *(c)* moisture. The better grades of plantation rubber are usually quite clean and need no washing, but a large percentage of the wild rubbers contains both dirt and moisture, sometimes 50 per cent and more.

If the weight of a sample to be tested for shrinkage is less than 2 kg. the whole sample is used. If the weight is greater than this, a representative portion of from 1 to 2 kg. is cut from it for the test. In any case, the portion to be tested is weighed to the nearest part per thousand. The sample is then washed on a washing mill until the removal of foreign materials is as complete as practicable, without loss of rubber. The standard laboratory-size mill with 6 by 12-in. corrugated rolls is quite suitable for handling samples of this size. The rubber is passed repeatedly between the rolls without banding. The optimum washing procedure depends on the nature of the sample and the type of impurity to be removed. Ordinarily from six to twelve passes through rather closely-set rolls are sufficient. The washed rubber should be taken from the rolls in as thin a sheet as possible without being lacy.

The washed sheets are then usually hung on racks to dry. If the rubber is too soft or weak to support its own weight, it is spread on screens of galvanized wire. The drying is carried out in a room protected from direct sunlight and maintained at about 40°C. (104°F.). Air is circulated over the rubber by means of a fan, and sufficient ventilation is provided to prevent the building up of a high relative humidity in the room. The rubber is usually weighed on the third day, and daily thereafter until the weight on two consecutive days is constant to 0.2 per cent. For the majority of samples the weight is found to be constant on the fourth or fifth day. The percentage of shrinkage is calculated from the equation

$$\text{Shrinkage (total)} = \frac{(A-B)100}{A}$$

where A is the original weight of the sample and B is the final weight after washing and drying.

In cases where the rubber is known to be free from solid foreign material but does contain some moisture, it is passed through the washing mill in a similar manner in order to provide a greater surface to the rubber for more rapid drying. In these cases, however, no water need be played on the rubber passing through the mill.

In some instances it may be desirable to separate the shrinkage into its two components: *(a)* foreign materials removable by washing, and *(b)* moisture removable by drying. The water-soluble constituents removed in the ordinary washing operation are negligible in amount. For determining these two components the following procedure is given:

A representative sample of the crude rubber is weighed as in the previous procedure. It is then blended well on the mill and divided into two equal portions. Some moisture may be lost during the blending and the dividing of the sample, but this will not affect the results provided the sample is uniform and divided equally. One

portion is washed and dried to constant weight as described previously. The second portion is sheeted thin without washing and then dried to constant weight in the same manner. The shrinkage due to dirt (all material, exclusive of moisture which is capable of being removed by washing) is calculated by the equation

$$\text{Dirt Shrinkage} = \frac{(C - D)100}{0.5A}$$

where C is the weight of the dried (but unwashed) portion of the sample and D is the weight of the washed-and-dried portion.

The shrinkage due to moisture alone is calculated from the equation

$$\text{Moisture Shrinkage} = \frac{(0.5A - C)100}{0.5A}$$

It should be noted that washing does not always remove all the foreign material from the rubber. A considerable portion of the fine dirt present may simply be dispersed in the rubber and some of the bark and woody material may be ground up and also dispersed during the washing process. The washed-and-dried specimen should therefore be examined as closely as possible to determine roughly the quantity of dirt present. The cleanliness of the washed-and-dried sample should be reported, and may enter into the grading of the rubber.

Chemical Tests

The most important constituent of a crude rubber is the rubber hydrocarbon itself. In the case of wild rubbers the hydrocarbon content is quite variable, and a chemical analysis for this constituent is, therefore, quite often necessary. Oher chemical determinations frequently performed on crude rubber are acetone extract, which is usually an indication of the resin content of the rubber; ash content; and insoluble material, both of the latter being an indication of the cleanliness of the rubber or of the method of its preparation. Other less frequently performed chemical analyses, although very important for some purposes, include those for proteins, water extract, and salts of metals such as copper and manganese. The results of all chemical analyses are determined on and reported on the basis of a washed-and-dried sample.

(a) Kubber Hydrocarbon Content—Traditionally the rubber hydrocarbon content has been found by difference, by subtracting the sum of the nonhydrocarbon constituents from 100 per cent. This method is neither accurate nor reliable, however, because the classes set up to include minor constituents are not mutually exclusive in all cases, and also because any method involving differences includes the summation of errors in the other determinations.

A fairly recent development for the direct determination of the rubber hydrocarbon was made by Burger, Donaldson, and Baty *(6)* employing the chromic acid oxidation of an extracted sample of rubber with subsequent distillation and titration of the acetic acid formed. This method proved to be very satisfactory, and it has been successfully used at the National Bureau of Standards in determining the rubber hydrocarbon content of several hundred samples of wild rubber. More recently a gravimetric rubber-bromide precipitation method was perfected by Willits, Swain, and Ogg *(45)* which has also proved to be very satisfactory.

(b) Acetone Extract—The acetone extract is determined on the sample which is subsequently used for the analysis of the rubber hydrocarbon content. The usual procedure is followed as described in A.S.T.M. Tentative Methods of Chemical Analysis of Rubber Products (D 297—43 T)*, except that the size of the sample to be used must obviously be that recommended for the analysis of the rubber hydrocarbon.

(c) Ash—The ash in the sample is determined by the "Rapid Method" as described in Methods D 297 — 43 T, except that for crude rubber it is not necessary to extract the sample before burning, as is done with vulcanized samples of rubber.

(d) Insoluble Material—For the determination of insoluble materials a sample of 1 to 2 g. is weighed accurately and placed in an accurately weighed or tared centrifuge tube with 50 or 100 ml. of toluene (or benzene), and an amount of trichloro-acetic acid equal to about 1 per cent of the weight of the sample is added. The centrifuge tube is placed in direct sunlight or near some artificial source of intense actinic light and is stirred occasionally until the sample has completely dissolved and the solution has become thin and limpid. Solution may also be effected by placing the centrifuge tubes and contents in an oven or water bath at 50° to 75°C., with due precautions to avoid fire. Solution is usually complete in a few hours.

The tubes are then placed in a centrifuge. Centrifuging is conducted at as high a speed as practicable, at least 1800 rpm. in any case, and continued until the insoluble material is collected in a mat at the bottom and the supernatant liquid is clear. The liquid is carefully separated by means of a siphon, and the residue is washed with a fresh portion of toluene and separated in the centrifuge as before. The toluene is removed, and the residue is then washed with acetone to take out any resins that may not be soluble in toluene, and whirled again. The acetone is removed, and the centrifuge tubes and residues are then dried for 1 hr. at 105°C., cooled in a desiccator, and weighed. This residue is calculated and known as the insoluble material in the rubber.

(e) Proteins—The amount of protein in the rubber is found by determining the nitrogen content of the rubber by the Kjeldahl method, and then multiplying the percentage of nitrogen by 6.25. The method described in Methods D 297 — 43 T for the determination of glue can be followed except that the sample is not to be extracted first, and for convenience weaker solutions, 0.02 N, of acid and alkali are employed. Blank determinations must, of course, be made on the reagents.

(f) Water-Extract—The water-extract of crude rubber is determined only in special cases, as when the presence of considerable amounts of gum or serum solids is suspected. In most crude rubbers, the water-extract is small and includes materials which are also soluble to a greater or less extent in acetone. The extraction of water-soluble constituents from crude rubber is slow and, as ordinarily conducted, is incomplete because of the very low rate at which these materials diffuse through the rubber. It is important, therefore, that the largest possible surface of the rubber be exposed during extraction. The following procedure has yielded higher percentages of water extract than were obtained by other means and is therefore probably a better method:

A convenient quantity of the rubber, say 100 g., is broken down on the mill until soft and well blended. A specimen of 1 to 2 g. is weighed accurately and is sheeted thin on the mill. Successive small portions of

* 1946 Book of A.S.T.M. Standards, Part III-B, p. 939.

soft filter paper are wrapped in the sheeted sample and are passed through the mill in such a way as to mix intimately the rubber and the paper, more paper being added as long as the mixture seems sticky. Care is exercised that no rubber is lost. The resultant crumb is then wrapped in several thicknesses of surgical gauze and is extracted for 24 hr. with boiling water in the equipment used for acetone extraction. The water extract is evaporated to dryness, heated for 1 hr. at 105°C., cooled, and weighed.

(*g*) *Copper and Manganese*—These trace constituents may have an important bearing on the aging characteristics of the rubber. They are especially important in determining the likelihood that samples will become tacky on storage. Chemical methods for the determination of these elements in rubber are described in Methods D 297 - 43 T and also by the Crude Rubber Committee (*11*). Recently McGavack has simplified this procedure by making use of a grating spectrograph for the determination of these trace elements (*25*).

(*h*) *Summation of Results*—The relation between the sum of the constituents found in an analysis and 100 per cent affords a check on the completeness and accuracy of the analysis. With rubber there is the complicating feature that the constituents as found by analyses are not always mutually exclusive. For example, most of the constituents which form ash when rubber is burned also appear as insoluble matter. Also, small amounts of rubber hydrocarbon of low molecular weight may be found in the acetone extract, and proteins may not be completely separated in the insoluble matter.

For most practical purposes the composition of crude rubber may be summed up as follows:

Rubber hydrocarbon, per cent.....——
Acetone extract, per cent.....——
Insoluble matter, per cent.....——
Total, per cent.....——

The sum of these three items, for most samples, does not differ from 100 per cent by more than 1 per cent.

If the sum of these three constituents should be less than 100 per cent, the difference may be due to proteins that are not completely collected with the insoluble matter. In such cases if a more informative analysis is desired the proteins should be determined both on the original rubber and on the insoluble matter, and the latter then corrected for proteins. The summation would then be:

Rubber hydrocarbon, per cent.....——
Acetone extract, per cent .....——
Proteins, per cent.....——
Insoluble matter (except proteins), per cent..——
Total, per cent .....——

If the sum should still be less than 100 per cent by a significant amount, a search should be made for some constituent other than rubber hydrocarbon which is insoluble in acetone and soluble in toluene.

Analytical determinations are commonly reported to 0.1 per cent since the uncertainty of most of the determinations is greater than 0.1 per cent and less than 1 percent. The summation of an analysis is in most cases regarded as satisfactory for routine purposes if the total lies between 98 and 102 per cent. The average analysis, of course, is well within these limits.

Physical Tests

The most important of the physical tests are those made upon a vulcanizate of the crude rubber. Of these, those most commonly used seem to be the tensile strength, ultimate elongation, and stress of the rubber at some lower elongation (modulus). Also of great importance in many cases as a test on the vulcanizate is the resistance to accelerated aging. For rubber in the unvulcanized state the only properties which have been given much consideration are viscosity and plasticity. The various instruments used for these latter tests are of three types: (*a*) compression, (*b*) extrusion, and (*c*) shearing. Of these, the shearing viscometer seems to have been given the most consideration in recent years, and is therefore discussed here. After further development a scorch test and also a measure of tackiness may prove to be very valuable in evaluating a crude rubber.

(*a*) *Vulcanization Tests*—The Crude Rubber Committee, in an early report (*11*), recommended the use of the following formula for the compounding of crude rubber for test purposes:

Rubber	100.0 parts by weight
Zinc oxide	6.0 parts by weight
Stearic acid	0.5 parts by weight
Mercaptobenzothiazole	0.5 parts by weight
Sulfur	3.5 parts by weight

This formula was designed not to give the optimum physical properties for the crude rubber, but to bring out its vulcanization characteristics. The Committee recommends the use of 127°C. (equivalent to a steam pressure of 20 psi.) for the vulcanizing temperature, and the periods of curing to be 20, 30, 40, 60, and 80 min. It suggests that moduli (stress) be measured at 500, 600, and 700 per cent elongations.

Although the above recipe and procedures proved to be very satisfactory for testing and evaluating plantation rubbers, several weaknesses were encountered when some of the wild rubbers were tested. The quantity of stearic acid in the test formula was made low so as to indicate any deficiency of fatty acids in the crude rubber. Actually most of the wild rubbers other than Hevea are known to be abnormally low in these fatty acids, and this test formula does not do these rubbers justice in evaluating their stress-strain properties because these deficiencies can be compensated in the compounding of the rubber.

The National Bureau of Standards, in its program of testing and evaluating wild rubbers, began in 1942 to increase the quantity of stearic acid in the test formula to 4 parts by weight per 100 of rubber. The Crude Rubber Committee in its April, 1944, Report (*15*) recommended the addition of a second recipe. The older formula is now known as ACS-I and is to be used for rubbers containing sufficient fatty acids, while the new one is called ACS-II and is to be used in testing wild rubbers. The ACS-II formula is as follows:

Rubber	100.0 parts by weight
Zinc oxide	6.0 parts by weight
Stearic acid	4.0 parts by weight
Mercaptobenzothiazole	0.5 parts by weight
Sulfur	3.5 parts by weight

For wild rubbers having a deficiency of fatty acid the ACS-II formula yields a vulcanizate having much higher tensile properties than those obtained by using formula ACS-I. However, for plantation and wild rubbers having a sufficiency of natural fatty acids there is very little difference between the results obtained from using the two different formulas.

Some of the wild rubbers, even with the increased quantity of stearic acid, are very slow in curing, the time required in some cases being several hours. To save time it has been found advantageous, therefore, to increase the temperature of cure from 127° to 141°C.,

which corresponds to steam at a gage pressure of 40 psi. This increase of temperature does not seem to impair the accuracy of the test.

As the different wild rubbers show considerably greater variation in the time of cure than the plantation rubbers, a greater range of curing times is necessary. Recommended times of cure are 5, 10, 15, 20, 30, 45, 65, 100, 150, and 225 min. These periods have been selected by making, in most cases, each of them aproximately 50 per cent greater than the next lower time of cure. Although ten different periods of cure are recommended, it is very seldom that more than four or five of them are needed for the tests.

Three to five sheets are vulcanized for tension testing. One sheet is vulcanized to approximately the optimum cure, at least one is undercured, and at least one overcured. The optimum cure is considered in this paper to be that which gives the highest tensile strength. This may not be considered the best technical cure, but it is one which probably can be reproduced better by different individuals. A preliminary estimate of the time for optimum cure may be made by vulcanizing a series of small sheets for different periods and judging the state of cure by observing the set, the strength, and the resistance to tear by hand tests. This estimate is checked by the subsequent measurement of tensile properties, and if necessary additional sheets of the standard size are prepared to show the curing behavior.

The stress-strain determinations are made by means of a Scott tension tester or equivalent machine capable of giving accurate measurements of stress. The elongation is observed visually, and the force at intervals of 100 per cent is recorded by the spark method. Values of the stress in pounds per square inch are read directly from the chart, the thickness of the specimen having been taken into account by adjustments on the machine. Four or more test specimens from each cure are measured, the results are averaged, and the average is reported. The discarding of erratic results is done in accordance with the procedure recommended in "Federal Specifications for Rubber Goods" *(16)* rather than that recommended in A.S.T.M. Standard Methods of Sample Preparation for Physical Testing of Rubber Products (D15-41).* The average thickness, not the minimum thickness, of the specimen is used in the calculations because the strips are found to break at random places rather than at the thinnest part.

When a dumbbell test specimen breaks in the clamps the results obtained on this specimen are discarded. When the result of a single specimen is more than 10 per cent below the average of the set, it is assumed that there was a flaw in the test specimen and the results from this specimen are also discarded. When this occurs additional specimens are tested and averaged. The stress-strain curves, as well as the numerical results, are reported for at least three cures: *(a)* optimum (highest tensile strength), *(b)* closest undercure, and *(c)* closest overcure. These curves aid materially in making comparisons among different samples or in evaluating individual samples.

With the exception of the directions just given for the vulcanizing tests, Methods D15-41 and A.S.T.M. Standard Methods of Tension Testing of Vulcanized Rubber (D412-41)** and procedures recommended by the Physical Testing Committee of the Division of Rubber Chemistry of the American Chemical Society *(30)* are followed. The temperature of 82°F. (27.8°C.) and a relative humidity of 45 per cent were recommended as standard by the above-mentioned committee as these conditions can be met in most climates where rubber laboratories are located. These atmospheric conditions are quite uncomfortable to the worker, and now that air conditioning has become more prevalent there is considerable sentiment in favor of changing them. The lowering of the temperature would certainly be desirable.

These stress-strain tests require a moderately large sample when conducted on the usual scale. Ordinarily a batch is mixed with 500 g. of crude rubber. Such a batch will provide enough material for conducting the preliminary vulcanization tests to determine the time of cure and for making five 6 by 6-in. sheets; and there will still be stock left for repeating some of the cures, if necessary. Tests can, if necessary, be made on samples of 100 g. or even less. The test sheets, then, are made in a 2 by 4-in. size instead of a 6 by 6-in. size. Each of the small sheets will provide three test specimens having a ⅛-in. constricted portion.

Vulcanization tests are subject to variations from a number of sources. In order to insure consistent and uniform results, a standard blend of crude rubber is tested from time to time for purposes of reference. Any errors that may have crept into the testing procedure are shown at once by a change in the values obtained on the standard sample.

The Scott tension tester is not well adapted to obtaining stresses at relatively low elongations, particularly with some of the softer wild rubbers. In order to get a relation between the stress and strain at these low elongations, fixed stresses may be applied to strip specimens by dead-weight loading and the resulting elongations measured. The specimens, ¼ or ½ in. wide and 6 in. long, are cut from standard test sheets. If bench marks are placed 10 cm. apart on the strips and a scale graduated in millimeters is used to measure the distance between the marks, the elongation can be observed directly to the nearest 1 per cent. Since rubber exhibits a continued increase of elongation with time, it is recommended that the elongation be measured at some definite period of time, say 1 min., after the application of the load.

Preliminary tests conducted at the National Bureau of Standards have shown that measurements of elongation at a stress of 200 psi serve to show large differences between different kinds of wild rubber. A blended smoked sheet vulcanizate, compounded according to A.C.S.-II formula, yields elongations of about 250 per cent. Soft wild rubbers may give values ranging up to 600 per cent or more. Two different types of rubbers having approximately the same tensile strength and elongation may have widely differing moduli at low stresses. This is exemplified by stress-strain curves obtained for Mangabeira rubber as compared with *Hevea brasiliensis* rubber *(3)*.

(b) Accelerated Aging Tests—When the crude rubber is to be used for the manufacture of articles in which aging is a great factor, tests on accelerated aging should be performed by either the oxygen-pressure method described fully in A.S.T.M. Standard Method of Test for Accelerated Aging of Vulcanized Rubber by the Oxygen-Pressure Method (D572-42)† or by the oven method described in A.S.T.M. Standard Method of Test for Accelerated Aging of Vulcanized Rubber by the Oven Method (D573-45).†† The test specimens are those prepared under the conditions of optimum cure as previ-

* 1946 Book of A.S.T.M. Standards, Part III-B, p. 242.
** *Ibid*, p. 247.
† *Ibid*, p. 254.
†† *Ibid*, p. 259.

ously described. The loss in strength is reported in per cent.

(c) Mooney Viscosity—The measurement of Mooney viscosity *(28)*, which is widely used for evaluating processing characteristics of synthetic rubbers, gives quantitative expression to properties of crude rubber that have hitherto been described only in qualitative terms *(29)*. The method of measuring the viscosity of crude rubber is the same as that which has been in general use for GR-S synthetic rubber, the viscosity being measured by means of the large rotor after 1 min. of warm-up and 4 min. of operation of the instrument at 100°C. The general principle and description of the instrument are given by Mooney *(28)*, and more detailed instructions on the actual operation and maintenance are described by Taylor *(37)*.

(d) Scorch Test—The tendency of a rubber to scorch may be associated, at least in part, with the viscosity of the rubber in that the higher the viscosity the higher are the temperatures generated during the various factory procedures. Several methods have been developed for determining the tendency to scorch. Probably the simplest methods are those involving the use of the Mooney viscometer. The first of these methods was published in 1940 by Weaver *(42)*. Recently more satisfactory procedures for measuring scorchiness by the Mooney viscometer have been presented in unpublished work by Shearer, Juve, and Musch and also in work conducted by Taylor at the National Bureau of Standards and presented in another paper of this symposium *(38)*.

(e) Tackiness Test—The tack of a rubber is its ability to adhere to itself or to other materials. Tackiness is a very important property in manufacturing operations such as building up plies of rubber and fabric. In spite of the importance of this test it was only recently that a reliable test was developed for its measurement *(7)*.

Grading of Wild Rubber

In the early days of rubber production all crude rubber came from wild trees of many different species. Plantations were later started, using in almost all cases the *Hevea brasiliensis* tree, which naturally led to the production of a more uniform crude rubber that in later years displaced almost all wild rubber on the market. During the years of the recent World War, when the Allied Nations were cut off from most of the supply of plantation rubber, there arose a sudden demand for all types of natural rubber, regardless of cost or quality, to supplement the synthetic rubber which had not proved itself to be suitable for all purposes.

Wild rubbers and gums of all types from Central and South America and Africa were purchased by the Rubber Development Corp. and distributed to the various manufacturers of rubber products, who used them mostly in blending with higher-grade natural rubbers or synthetic rubbers. Although these wild rubbers were normally graded as to *(a)* unwashed, or washed-and-dried, *(b)* method of preparation, *(c)* geographic location, and *(d)* species of tree *(2)*, there was also a need for further evaluating them by laboratory tests. To this end the National Bureau of Standards cooperated with the Rubber Development Corp. in drawing up tentative tests and a system for grading and evaluating these wild rubbers. The original methods were modified somewhat from time to time as more experience was developed.

On the basis of experience gained during the testing and analyses of over 1000 different samples of wild rubber of all types, a method for their grading on the basis of the tests just described has been drawn up. This system is proposed not for recommendation in its present form but for the purpose of stimulating discussion and comments on the subject. It is hoped that these comments may later lead to the formulation of definite procedures acceptable to all concerned.

The method suggests the grading of the wild rubber on the basis of two separate criteria, namely, *(a)* the quality and *(b)* the rubber hydrocarbon content. This dual system of grading is suggested because the two criteria often bear no relationship to each other. The quality of the rubber determines how readily the rubber can be used in manufacture and in what products it can be employed. The rubber hydrocarbon content determines the "purity" or actual quantity of rubber-like material present, and thus forms the basis for the amount of fillers and other compounding ingredients to be added. The quality of the rubber is rated in four grades: I, Excellent; II, Good; III, Fair; and IV, Poor. The rubber hydrocarbon content is reported in percentage, as determined by some reliable analytical method.

The significance of the different grades is outlined as follows:

I (Excellent): Equivalent to the best grades of plantation rubber. Capable of producing a vulcanizate having excellent properties.

II (Good): Inferior to Grade I but still suitable for most ordinary manufacturing operations without much modification of vulcanizing formulas and without serious difficulties in processing or marked impairment in the quality of the vulcanizate.

III (Fair): Capable of being used in manufacture, but requiring either considerable modification of vulcanizing formulas or extensive blending with better grades of rubber. May be inferior in processing characteristics and quality of the vulcanizate.

IV (Poor): Poor in processing characteristics and quality of vulcanizate, even when quite extensively blended with good grades of rubber. Not recommended for use in its present state for manufacturing operations.

The quality ratings on the wild rubber are to be based on the properties of a sample after washing and drying, and therefore represent the possibilities of the rubber rather than the actual condition of the crude material as received. A measurement is made of the shrinkage of the rubber on washing and drying. The result of this test is reported but does not enter into the evaluation of the rubber. The color of the rubber is also noted and reported but does not affect the grading of the quality since for most manufactured products color is unimportant.

Observations are made on the general appearance of the rubber both before and after the washing and drying operations. Some of these properties may later enter into the evaluation of the rubber, especially in borderline cases or for rubbers to be used for special purposes. The quality is graded almost altogether from the results obtained on *(a)* the analysis of the quantity of material extractable by acetone, *(b)* time and temperature conditions necessary to vulcanize to optimum cure, *(c)* elongation produced when a vulcanized sample is

TABLE I.—SUGGESTED BASIS FOR GRADING THE QUALITY OF WILD NATURAL RUBBER.

Property	I (Excellent)	II (Good)	III (Fair)	IV (Poor)
Acetone Extract, per cent	3 or less	3 to 6	6 to 15	15 or more
Minimum curing time in minutes at 141°C for maximum tensile strength	20, 30, or 45	15 or 65	10 or 100	5 or less 150 or more
Elongation, at 200 psi., per cent	300 or less	300 to 400	400 to 600	600 or more
Tensile strength, psi.	3300 or more	2500 to 3300	1500 to 2500	1500 or less
Ultimate elongation, per cent	750 or more	700 to 750	600 to 700	600 or less
Mooney viscosity ML (212)4 min. (consistency)	90 or more (firm, tough)	70 to 90 (slightly soft)	50 to 70 (soft, but does not flow)	50 or less (flows, sticky, hard to handle)
Numerical rank	1	2	4	8
Sum of numbers indicating final rating	6 to 8	9 to 16	17 to 33	34 to 48

subjected to a tension of 200 psi., *(d)* tensile strength, *(e)* ultimate elongation of the vulcanized material, and *(f)* the viscosity of the raw material as measured by the Mooney viscometer. In special cases there are other tests which are desirable or necessary, such as water extraction, shrinkage due to foreign material other than moisture, etc. These tests may influence the grading of the rubber but only after a guiding evaluation has been made by means of the previously-mentioned properties.

When a sample of wild rubber is received at the laboratory for test, it should, if possible, for future record be accompanied by as much of the following information as possible: *(a)* botanical species of tree from which the rubber was obtained, *(b)* the country and location of origin, *(c)* method of preparation, and *(d)* date of collection. The sample is then examined in the condition of its arrival, and record is made of its weight, shape, color, odor, degree of cleanliness, and consistency. In nearly all cases it will be necessary to cut into the sample at various places in the examination for dirt and moisture. The dirt should be classified, if possible, as to wood, bark, sand, etc. If the sample is found to be soft, tacky, weak, firm, tough, strong, etc., these facts should also be noted. Record is made of the form of the sample—whether ball, slab, lump, crepe, sheet, etc. For crepe, slab, or sheet, the thickness is measured and any distinctive markings are noted.

The sample is weighed immediately upon receipt. If the weight of the sample is less than 2 kg., the whole sample is washed and dried. If the sample is larger than this, a representative portion of from 1 to 2 kg. is used for the analysis and tests. If the sample is found on inspection to be clean and dry, it is blended on a warm mill, and portions are taken for the various analyses and tests which will be described later. If the sample is not clean and dry, a shrinkage determination will be necessary and the subsequent tests are made on the washed-and-dried product.

Suggested Basis for Grading

Table I gives ranges of characteristic values of properties which might closely correspond to the grading of rubber into the four classes. The procedure for rating rubber according to this table is as follows:

1. Assign a numerical rank—1, 2, 4, or 8, according to the results of the physical and chemical tests, to each of the six properties listed in the table. If the property has the value of the limit between two cases, assign to it the rank of smaller numerical value.

2. Add these numbers together and determine into which column or grade the total falls.

3. If the number falls fairly close to the center of a range and if the individual numerical ranks are reasonably uniform, assign the rating at the head of that column to the sample.

4. If, however, the sum falls near the borderline between two grades, or if the individaul ratings are scattered, the properties of the sample should be studied critically from the standpoint of cleanliness, appearance, practical utilization, or any other property which might have an influence, and the rating then shifted to the higher or lower grade, whichever seems to be better suited to the sample.

If for some reason or another some of these properties are not measured the sum of the numbers indicating the final rating must, of course, be changed accordingly. The same is also true when other properties are added to those listed in the table. Many of the numerical values reported in the table are quite obvious. Others may require some explanation. For example, there is an optimum range of time for vulcanization. Excessively fast curing rubbers are disadvantageous in use as well as the extremely slow curing ones.

It is generally customary to measure moduli on vulcanizates at 600 or 700 per cent elongation. However, with an apparatus for measuring the elongation at constant stress more precision can be obtained, thus permitting lower elongation. This property has been included in the table because no upper limits have been placed on the values for ultimate elongation. The limits given in the table for elongations at 200 psi. are suggested after examination of stress-strain curves for a number of wild rubbers of various types.

It is generally preferable to have a crude rubber with not too high a Mooney viscosity because of the extra power necessary to break down the rubber. However, from the results of tests of many of the wild rubbers it has been found that all the better-grade rubbers, as judged by properties of the vulcanizate, have the higher values of viscosity. Many samples of the tougher and firmer wild rubbers were found to have Mooney viscosities as high as 100 or even 110. Samples that were slightly below normal in strength, firmness, and toughness had viscosities of 70 to 80. Samples of low-grade rubbers, such as earth scrap, usually showed viscosities of 60 and below. Very inferior rubbers that were soft and tacky and flowed on standing gave viscosities as low as 20 or 30.

Plantation Rubber

Factors Causing Variability

Although the test methods for plantation rubber would in most cases be the same as those previously described for wild rubber, the system for the grading of plantation rubber may have to be different. In the first place, practically all of the plantation rubber comes from one species of tree, the *Hevea brasiliensis*. Plantation rubber is prepared in the form of either sheets or crepes, there being generally produced no balls, slabs, etc. Plantation rubber is usually dry and relatively clean, not requiring a "shrinkage" test in its evaluation.

Estate rubber is usually prepared under better technically controlled conditions than native rubber and is therefore generally more uniform in properties than the rubber produced on small holdings. On even the best-operated estates there are, however, some uncontrollable factors such as *(a)* the age of the trees, *(b)* soil variability, *(c)* seasonal variations, etc., which have an effect on the composition of the latex, and therefore introduce some degree of variability in rubber. These uncontrollable factors are believed by some investigators to exert but a small influence on the rubber as compared with the controllable ones *(5, 23, 40)*. This view, however, is not in agreement with Hastings and Rhodes *(19, 31)* and de Vries *(41)*, who blame the uncontrollable factors as much as the others.

It is generally conceded, however, that up-river fine Pará wild rubber is more uniform in properties than most best grades of plantation rubber *(1, 8, 9, 19, 20, 21, 33, 43, 44)*. The best grades of wild Pará rubber, in spite of their very dark color and their greater probability of containing more dirt, have frequently been able to demand a higher price than the best grades of plantation rubber. The native of the Amazon Valley who produces this excellent grade of uniform wild rubber is without technical control in his processing. He usually collects his latex from several different species of the *Hevea* tree which are probably not all of the same age. Surely the estate managers, with their large areas of monoclones and skilled help, if convinced of the necessity, should be able to produce as uniform a rubber as that made by the natives of the Amazon Valley. Estate rubber has thus far not exceeded the better wild rubbers as to uniformity, probably because the purchaser in most cases has demanded uniformity in color, etc., rather than uniformity in chemical composition and physical properties.

Thomas *(40)*, Bocquet *(5)*, and also Martin *(23)* report that only about 10 per cent of the variation in the properties of crude rubber is due to the uncontrollable factors in the latex itself and the remaining 90 per cent to variations in the operations of processing. If this is true, the plantations could quite easily increase the uniformity of their better grades of rubber. Just previous to the war there was introduced a special grade of plantation rubber, called USF rubber, having a great uniformity of properties *(26)*. This was a great step in the right direction.

Some of the existing variability in plantation rubber is due to the use of sulfuric acid and occasionally alum as coagulating agents, not only by the natives or smallholders *(5, 11, 32)* but also by the operators of large estates *(46)*. Wiltshire *(46)* and Martin and Davy *(24)* have found that the use of sulfuric acid as a coagulant does not produce an inferior grade of rubber if used under carefully controlled conditions, but even then it does produce a rubber having a slower rate of cure than that coagulated by acetic or formic acids. The use of sulfuric acid requires more intelligence and care in its application, as even a small excess is harmful to the rubber, whereas quite an excess of acetic or formic acids can be tolerated. The use of alum as a coagulant for natural rubber should definitely be forbidden. The type and quantity of coagulant to be used should therefore be standardized for all plantations.

The lack of standardization in degree of dilution of the latex before coagulation is another cause of nonuniformity in crude rubber. Some estates dilute to 12.5 per cent dry rubber content, others to a higher concentration, and still others do no diluting at all. Some of the other causes of variability in processing are: *(a)* quantity of stabilizer used previous to coagulation, *(b)* time allowed for coagulation, *(c)* amount of serum pressed from the coagulum, *(d)* rate of drying the sheet, *(e)* amount of smoking, and *(f)* the amount of machining and washing and the temperature of drying in the case of crepe rubbers. All of these processes which vary from factory to factory, and probably vary from time to time in the same factory, should be standardized in order to obtain the greatest uniformity possible.

Important Properties

The property of rubber requiring greatest improvement in uniformity is the rate of cure. The variation of this property, unless compensated for, carries on through vulcanization to the final product. The matter of uniformity in this property, as is the case with some of the others, is more important than the actual value of the property itself. The time required for a compound to reach its proper cure can be controlled by regulating the temperature and by the proper use of accelerators. It is not so important, therefore, if the nature of the rubber is to cure quickly or slowly, but when a large variability exists much blending and control testing is required in the factory.

The property next of importance in needing improvement in uniformity is the plasticity or viscosity, which has a great effect on the processibility or the way a compound can be handled in the factory. The Mooney viscometer was designed to measure this property but may also be adapted to measure the tendency of a rubber to scorch and to measure the elastic recovery of raw rubber *(38)*. It seems possible, therefore, that several of the more important physical properties of a raw rubber may in due time be measured by this instrument.

The desirable properties of a crude rubber are discussed in an excellent article by Sackett *(34)* in which he lists eight major requirements of the consumer. They include uniform rates of vulcanization, uniform plasticity, uniform age resistance, cleanliness, freedom from diluents, freedom from deleterious substances, and better packaging. Besides a uniformity in plasticity, Sackett suggests a low plasticity in order to eliminate, at least partially, the expensive mastication process.

Future Prospects

Before the war the only real competition which a rubber estate had was with the other estates or with the native rubber growers. All of the crude rubber was graded by the same superficial examination. Because of this system the producers have not been forced to meet the demands of high uniformity and quality of material. The situation in the future, however, may become quite different. The rubber grower has been given real competition—synthetic rubber.

During the war there was virtually no progress in the advancement of the technology of natural rubber, while the technology of synthetic rubber was, through necessity, making tremendous strides. Furthermore the quality of natural rubber in these immediate postwar years is much lower than it was previous to the war. A considerably higher percentage of plantation rubber today comes from the small producers or natives. Even the better-equipped estates have suffered because of lack of facilities such as machinery and proper coagulants.

There are many young compounders in the rubber factories today who have not had much experience with natural rubber. They have become accustomed to the greater uniformity of viscosity, uniformity of rate of cure, cleanliness, and other properties of the synthetic rubber, and may not in many cases be so eager to return to the use of natural rubber unless its uniformity is brought up to the same standard as found in the synthetic rubbers. Meuser and Stiehler *(27)* show that the uniformity in tensile properties and the viscosities of GR-S synthetic rubber has improved during the period of its manufacture and that the variation in these properties of rubber from plant to plant has become very small. All synthetic rubbers are purchased on specifications based on the results of laboratory tests.

Although natural rubber has in it some inherent qualities which none of the present-day synthetics has, there are relatively few articles which require the use of only natural rubber. The vast majority of the crude rubber requirements can be supplied either by natural or by synthetic rubber. Therefore, for the first time in history, the natural-rubber producers will be forced to improve to the limit the quality and uniformity of their product.

Recommendations

The rubber producers should wait no longer for the rubber consumers to agree and decide upon the properties they desire in crude natural rubber. The plantations should put forward all effort toward the standardization of their processes in order to produce the greatest possible uniformity in the intrinsic qualities of their rubber. After a controlled uniformity has been achieved, physical and chemical laboratory tests should then be performed on the various grades of rubber so as to describe their qualities. Limits could then be set on the variations of the properties based on the results of these tests. In this way a gradual change could be made from the present systems of grading plantation rubber solely on the basis of superficial appearance to a system based on the intrinsic quality of the rubber as determined by laboratory tests.

LITERATURE REFERENCES

(1) Anonymous, "Raw Rubber," *Vanderbilt News*, Vol. 4, No. 6, p. 17 (1934).

(2) Norman Bekkedahl, "Natural Rubbers: A General Summary of their Composition, Properties, and Uses," *India Rubber World*. Vol. 116, p. 57 (1947).

(3) Norman Bekkedahl and Waldemar Saffioti, "Mangabeira Latex and Rubber," *Rubber Age*, Vol. 60, p. 553 (1947).

(4) R. O. Bishop and R. G. Fullerton, "Variations in Plantation Sheet Rubber," *Journal, Rubber Research Inst. Malaya*, Vol. 3, p. 129 (1932). Reprinted in *Rubber Chemistry and Technology*, Vol. 5, p. 509 (1932).

(5) M. Bocquet, "The Problem of Making Uniform Crude Rubber and Its Standardization," *Revue Generale Caoutchouc*, Vol. 15, p. 326 (1938). Translated in *Rubber Chemistry and Technology*, Vol. 12, p. 1 (1939).

(6) Burger, Donaldson, and Baty, "A Direct Determination of Rubber Hydrocarbon; Chromic Acid Oxidation Method," *ASTM Bulletin* No. 120, January 1943, p. 23. Reprinted in *Rubber Chemistry and Technology*, Vol. 16, p. 660 (1943).

(7) W. F. Busse, J. M. Lambert, and R. B. Verdery, "Tackiness of GR-S and Other Elastomers," *Journal Applied Physics*, Vol. 17, p. 376 (1946). Reprinted in *Rubber Chemistry and Technology*, Vol. 19, p. 1163 (1946).

(8) V. Cayla, "The Variability of Raw Rubber," *Proceedings*, Rubber Tech. Conference (London) 1938, p. 32 (Paper No. 11). Reprinted in *Rubber Chemistry and Technology*, Vol. 12, p. 420 (1939).

(9) H. C. Crafton, Jr., "Upriver Fine Pará *versus* Plantation Rubber," *Rubber Age*, Vol. 49, p. 248 (1941).

(10) Crude Rubber Committee, "Report of the Crude Rubber Committee, Presented April 13, 1935," *Industrial and Engineering Chemistry*, News Ed., Vol. 14, p. 215 (1936).

(11) Crude Rubber Committee, "Abridged Summary of Reports of the Crude Rubber Committee of the Division of Rubber Chemistry of the American Chemical Society," *Rubber Chemistry and Technology*, Vol. 12, p. 633 (1939).

(12) Crude Rubber Committee, "Report of the Crude Rubber Committee, Presented April 11, 1940," *Rubber Chemistry and Technology*, Vol. 13, p. 441 (1940).

(13) Crude Rubber Committee, "Report of the Crude Rubber Committee, Presented September 12, 1940," *Ibid.*, Vol. 14, p. 289 (1941).

(14) Crude Rubber Committee, "Report of the Crude Rubber Committee, Presented April 11, 1941," *Ibid.*, Vol. 14, p. 755 (1941).

(15) Crude Rubber Committee, "Report of the Crude Rubber Committee, Presented April 26, 1944," *Ibid.*, Vol. 17, p. 529 (1944).

(16) Federal Standard Stock Catalog, Section IV (Part 5) "Federal Specification for Rubber Goods," No. ZZ-R-601a (1940).

(17) French Rubber Institute, "The Problems of Making Uniform Crude Rubber and Its Standardization," *Revue Generale Caoutchouc* Vol. 15, p. 326 (1938). Translated in *Rubber Chemistry and Technology*, "Vol. 12, p. 1 (1939).

(18) R. G. Fullerton, "Notes on Defects in Smoked Sheet and Crepe Rubber," *Journal*, Rubber Research Inst. Malaya, Vol. 1, p. 66 (1929). Reprinted in *Rubber Chemistry and Technology*, Vol. 3, p. 264 (1930).

(19) J. D. Hastings and Edgar Rhodes, "Effect of Rubber Variability on Vulcanization," *Industrial and Engineering Chemistry*, Vol. 31, p. 1455 (1939). Reprinted in *Rubber Chemistry and Technology*, Vol. 13, p. 209 (1940).

(20) E. A. Hauser, "Future Problems in Rubber," *Industrial and Engineering Chemistry*, News Ed., Vol. 13, p. 179 (1935).

(21) F. B. Jones, "Estate Practice and its Relation to Factory Requirements," *Transactions*, Inst. Rubber Industry, Vol. 9, p. 112 (1933). Reprinted in *Rubber Chemistry and Technology*, Vol. 7, p. 1 (1934).

(22) London Advisory Committee for Rubber Research (Ceylon and Malaya), "Report of Conference on Post-War Preparation and Packing of Rubber," *Rubber Chemistry and Technology*, Vol. 19, p. 865 (1946).

(23) G. Martin, "The Evaluation of Raw Rubber," *Transactions*, Inst. Rubber Industry, Vol. 6, p. 298. (1930). Reprinted in *Rubber Chemistry and Technology*, Vol. 4, p. 299 (1931).

(24) G. Martin and W. S. Davey, "Rubber from Latex Coagulated with Sulfuric Acid," *Journal*, Rubber Research Inst. Malaya, Vol. 5, p. 282 (1934). Reprinted in *Rubber Chemistry and Technology*, Vol. 8, p. 274 (1935).

(25) John McGavack, "Minor Element Content of Rubber and Rubber Plants," *Rubber Age*, Vol. 60, p. 565 (1947).

(26) John McGavack, Chester E. Linscott, and John W. Haefele, "USF, A New Crude Rubber," *Industrial and Engineering Chemistry*, Vol. 34, p. 1335 (1942). Reprinted in *Rubber Chemistry and Technology*, Vol. 16, p. 560 (1943).

(27) L. Meuser and R. D. Stiehler, "Standardization of Testing and Inspection in Government Synthetic Rubber Plants." Symposium on Rubber Testing. Am. Soc. Testing Mats., June, 1947.

(28) Melvin Mooney, "A Shearing Disc Plastometer for Unvulcanized Rubber," *Industrial and Engineering Chemistry*, Anal. Ed., Vol. 6, p. 147 (1934). Reprinted in *Rubber Chemistry and Technology*, Vol. 7, p. 564 (1934).

(29) Melvin Mooney, "The Rheology of Processing Quality of Raw Rubbers." *Journal Colloid Science,* Vol. 2, p. 69 (1947). Reprinted in *Rubber Chemistry and Technology,* Vol. 20, p. 585 (1947).
(30) Physical Testing Committee of the Division of Rubber Chemistry of the American Chemical Society, "Outline of Tentative Standard Laboratory Procedure for the Preparation and Physical Testing of Rubber Samples," *Rubber Age,* Vol. 26, (1930); *India Rubber World,* (1930). Reprinted in *Rubber Chemistry and Technology,* Vol. 3, p. 179 (1930).
(31) Edgar Rhodes, "Rubber Production," *Industrial and Engineering Chemistry,* Vol. 27, p. 1204 (1935); Reprinted in *Rubber Chemistry and Technology,* Vol. 9, p. 154 (1936).
(32) Edgar Rhodes, "A Survey of Latex Coagulants Used by Malayan Small Holders," *Journal,* Rubber Research Inst. Malaya, Vol. 7, p. 68 (1936). Reprinted in *Rubber Chemistry and Technology,* Vol. 10, p. 267 (1939).
(33) Felix Ripeau, "Observations on and Comparative Tests of the Latex of Wild and Plantation Hevea," p. 124 of "The Rubber Industry," edited by Torrey and Manders (International Rubber and Allied Trades Exhibition, Ltd., London, 1914).
(34) G. A. Sackett, "Consumers Crude Rubber Requirements," *Industrial and Engineering Chemistry,* Vol. 27, p. 1201 (1935). Reprinted in *Rubber Chemistry and Technology,* Vol. 9, p. 146 (1936).
(35) Philip Schidrowitz, "Variability," Chapter in Torrey and Manders' "The Rubber Industry" 1914, page 212.
(36) I. Sibiriakoff, "Tensile Tests of Plantation Rubber," *Revue Generale Caoutchouc,* Vol. 16, p. 365 (1939); Translated in *Rubber Chemistry and Technology,* Vol. 13, p. 451 (1940).
(37) Rolla H. Taylor, "Factors Affecting Results Obtained with the Mooney Viscometer," *India Rubber World,* Vol. 112, p. 582 (1945). Circular of the National Bureau of Standards C451, November 8, 1945. Reprinted in *Rubber Chemistry and Technology,* Vol. 19, p. 808 (1946).
(38) R. H. Taylor, J. H. Fielding, and M. Mooney, "Development and Standardization of Tests for Evaluating Processibility," Symposium on Rubber Testing. Am. Soc. Testing Mats, June, 1947. Published in *Rubber Age,* Vol. 61, pp. 567-73, 705-10 (1947).
(39) A. Thomas, "The Cultivation of Hevea in Indo-China," *Revue Generale Caoutchouc,* Vol. 16, pp. 248 and 289 (1939).
(40) A. Thomas, "The Problem of Crude Rubber," *Caoutchouc & Gutta-Percha,* Vol. 36, pp. 171 and 199 (1939). Abstracted in *Rubber Chemistry and Technology,* Vol. 13, p. 468 (1940).
(41) O. de Vries, "Estate Rubber, Its Preparation, Properties, and Testing." Drukkerijen Ruygrok and Co., Batavia. (1920).
(42) John V. Weaver, "Determination of Scorching of Rubber and Synthetic Compounds by Use of the Mooney Plastometer," *Rubber Age,* Vol. 48, p. 89 (1940). Reprinted in *Rubber Chemistry and Technology,* Vol. 48, p. 458 (1941).
(43) G. S. Whitby, "Plantation Rubber and the Testing of Rubber," Longmans, Green, and Co., New York, N. Y. (1920).
(44) W. A. Williams, "The Advantages and Defects of Plantation Rubber," p. 284 of "The Rubber Industry," edited by Torrey and Manders (International Rubber and Allied Trades Exhibition, Ltd., London, 1914).
(45) C. O. Willits, M. L. Swain, and C. L. Ogg, "Determination of Rubber Hydrocarbon by a Gravimetric Rubber Bromide Method," *Industrial and Engineering Chemistry,* Anal. Ed., Vol. 18, p. 439 (1946).
(46) J. L. Wiltshire, "Sulfuric Acid as a Latex Coagulant," *Journal,* Rubber Research Inst. Malaya, Vol. 4, p. 94 (1932). Reprinted in *Rubber Chemistry and Technology,* Vol. 6, p. 415 (1933).

Industrial Uses of Rayon Expanding in Rubber Field

INDUSTRIAL applications of rayon are expanding rapidly, particularly in the rubber field, according to a report recently issued by the Textile Research Department of the American Viscose Corporation at Marcus Hook, Penna. The biggest industrial consumer at present is the tire industry, which today takes a fourth of all rayon produced in the United States. Rayon cord tires have become standard for most trucks, buses, airplanes and large passenger cars, and many tire manufacturers have indicated that they will make rayon cord tires in all sizes when sufficient rayon is available.

Meanwhile, the rubber companies are extending the use of rayon fabric to a variety of other rubber goods, such as fan, conveyor and transmission belting, low and high pressure hose, diaphragms for compressors and as lining in overshoes. Rayon yarn is braided into packing for pumps, and flexible and macaroni type protective tubing for electric wire and cable. Rayon cord and rope are manufactured to a limited extent for special applications and where appearance is a prime factor.

One of the newest and most promising industrial uses of rayon is in non-woven fabrics. These are fibrous webs of viscose rayon staple, to which a bonding agent such as resin emulsion, latex, viscose, mineral acid or a plastic fiber such as Vinyon resin or plasticized cellulose acetate rayon has been added by spraying, dipping, padding, printing or otherwise blending with the non-adhesive viscose rayon fibers. The bonding agent may be applied in bands or stripes or as an over-all uniformly distributed material depending on the characteristics desired.

Disposable place mats, napkins and towels, which actually can be used several times, are among the many practical articles made of non-woven rayon fabrics. Others are disposable diapers, gift wrappings, ribbon, tape, interlining for men's and women's suits, casket linings, tea bags, filters, wall and table coverings. Coming soon are one-season draperies and window curtains of non-woven rayon.

Rayon flock, which is filament cut into standard short lengths of from ½ mm. to ¼", is used to make "felt" for phonograph turn tables and lining the glove compartments of automobiles. By electrostatic means, a beater bar or simply spraying, flock is attached evenly with a suitable adhesive, such as plastic latex or a lacquer Casein glue, to a backing of paper, glass, metal, wood, wall board or fabric.

Woven and non-woven rayon fabrics and fibrous rayon mats have been used experimentally in making laminated plastics. So far the price differential in comparison with paper and cotton ducks and non-availability of rayon in suitable construction, have been major restrictions on its commercial adoption in laminated plastics. An increasing number of machined and molded articles of rayon reinforced laminated plastics are expected to be on the market soon.

Development of the Clay Coagulation Process for the Reduction of Electrolyte in GR-S

By E. A. WILLSON[1], L. H. RIGGS[2], G. L. WHEELOCK[3], and B. M. G. ZWICKER[3]

A process has been developed for the effective elimination of electrolytes from American-made rubbers such as the butadiene-styrene copolymer known as GR-S. This process involves the use of a protective agent such as Dixie clay during the coagulation process. An amount of Dixie clay of about 1% on the rubber is recommended on the basis of batch coagulations. The method is most effective when the polymers are extracted with alkali to remove the fatty acid normally present, but low electrolyte polymers containing fatty acid can also be made under the proper conditions.

While a practical procedure has been developed for reducing the electrolyte content of the polymer, the importance of this improvement to the electrical industry has not been conclusively determined. Laboratory electrical tests have indicated that a significant degree of improvement in dielectric properties has been realized both by salt-acid coagulation in the presence of Dixie clay and by alkali extraction of the fatty acid in the polymer. These tests were conducted on both gum stock and "cable" recipes.

PRODUCTION of the butadiene-styrene copolymer known as GR-S ordinarily involves coagulation with salt and acid and the product contains considerable soluble ash, mostly sodium chloride. Alum coagulation results in considerably lower electrolyte content, and such a polymer, GR-S AC, has been in production for some time.

The United States Rubber Company has developed a low electrolyte polymer GR-S 65 for electrical applications by resorting to a salt-free acid coagulation process. Although this process has provided a GR-S type rubber for electrical use, special equipment is required for satisfactory operation of the process or else large quantities of protective agent must be used to prevent excessive crumb agglomeration. The shock of the acid on the small particle size latex can easily result in cloudy serum and difficulties in operation of the filtering equipment of a polymer plant.

This report describes the development of a convenient operating process for reducing the soluble electrolyte in GR-S or other American-made rubbers to negligible quantities.

It is not surprising that GR-S contains salt since the use of as much as 40 pounds of salt per hundred pounds of rubber is not uncommon. Controlled coagulation with salt and acid is known to be most effective in producing polymer in the form of fine, porous, easily-extractable crumbs. Exhaustive water extraction of such crumbs reduces the electrolyte content of the polymer materially, but considerable unextractable "salt" still remains in the polymer. For example, a 50 Mooney (ML-212° F., 4 min.) GR-S polymer latex was coagulated to fine porous crumbs not exceeding 1 mm. in diameter with sodium chloride and sulfuric acid. After eleven successive leachings with ten times the polymer weight of distilled water, totaling 48 hours, the polymer still contained 0.144% chlorides as sodium chloride. The final wash of 18 hours removed less than 0.01% salt from the polymer.

Two methods have been investigated in the attempt to realize further reductions in occluded electrolyte: (1) coagulation in low electrolyte systems (alum, acid alone, etc.) and (2) the use of protective agents to improve the porosity of the coagulum. The second method has been shown to be very effective and easily controllable.

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Experimental Method

The method used for determining the per cent electrolyte in a rubber was suggested by the electrical cable industry. Eight grams of rubber are ashed at low temperature. It is not necessary to burn completely all specks of carbon. The electrolyte is then extracted in 24 cc. of warm distilled water of known purity and the resistance of the unfiltered sample is determined at 30° C. by use of a modified Wheatstone bridge. The resistance of the sample is then translated into per cent electrolyte (as NaCl on the polymer) by use of standards of known NaCl concentrations.

The unit employed for this work consisted of a Leeds and Northrup AC Galvanometer No. 2370D in conjunction with a Leeds and Northrup 4-dial variable resistance box and a conductivity cell with bright platinum electrodes. Although the Wheatstone bridge is capable of extreme accuracy in the range employed, small errors in results may be found by using samples which are not absolutely representative of the rubber being tested. From this standpoint, mill massed samples are preferable.

Preliminary Laboratory Investigation

Coagulation using alum, calcium chloride, or sprayed acid alone (no salt) as coagulant gave some improvement in electrolyte content over controlled fine crumb coagulation with salt and acid. For example, in the laboratory HCl spray and dilute alum coagulation gave 0.065% and 0.09% electrolyte, respectively, compared to 0.20% in fine crumb salt-acid coagulated polymers. The straight acid coagulation was very difficult to control, and therefore coagulation methods involving salt creaming were also investigated.

The use of protective agents was studied and several materials, such as clays, glues, etc., proved to be effective. For example, the presence of one per cent of Dixie clay on the polymer during alum coagulation of a GR-S latex eliminated four-fifths of the occluded electrolyte as shown by the data in Table I. Alum was first used as the coagulant so that a "low electrolyte" initial serum could be obtained.

Although salt-acid coagulation creates a high electrolyte serum, the effect of a protective agent in this system was also investigated. Surprisingly enough, it

TABLE I—EFFECT OF DIXIE CLAY ON ALUM COAGULATION

	Electrolyte as % NaCl on Polymer
1% Dixie Clay* on polymer	0.018
No Clay	0.090

* The Dixie clay used was a grade produced in Aiken County, South Carolina, and commonly employed as a pigment in rubber manufacturing. It has a particle size from 0.2 to 75 microns.

TABLE II—COMPARISON OF VARIOUS COAGULANTS AND PROTECTIVE AGENTS

Coagulation	Protective Agent (1% on Polymer)	Electrolyte as % NaCl on Polymer (Alkali Extracted Polymers)
Salt-acid	Glue	0.08
Alum	Glue	0.04
Salt-acid	Dixie Clay	0.006
Alum	Dixie Clay	0.004
		Unextracted Polymers
Salt-acid	Bentonite	0.045
Salt-acid	Dixie Clay	0.010
Salt-acid	None	0.204

TABLE III—EFFECT OF ADDITION OF PROTECTIVE AGENT TO LATEX VS. ADDITION TO COAGULANT

Protective Agent Addition (1% on Polymer)	Electrolyte as % NaCl on Polymer
None	0.204
Clay in Latex	0.004
Clay in Acid	0.007
Glue in Latex	0.081
Glue in Acid	0.138

TABLE IV—EFFECT OF ALKALI EXTRACTION ON ELECTROLYTE CONTENT

(Production Batch Coagulation)

Crude Mooney (ML, 212°, 4')		55	81	56
Not extracted	% electrolyte	0.2040	0.1290	0.0135 *
	% ash	1.24	1.30	1.34
Extracted	% electrolyte	0.0075	0.0084	0.0099
	% ash	0.95	0.95	0.98

* Latex was at room temperature when coagulated. (Other three charges were coagulated immediately after stripping, so that the latex was still warm.) The small particle size so obtained was evidently responsible for the lower electrolyte content prior to fatty acid extraction.

TABLE V—EFFECT OF WASHMILLING ON ELECTROLYTE AND ASH CONTENT

(Salt-Acid Coagulated, Alkali Extracted and Washed)

Type Polymer	Crude Mooney	Electrolyte as % NaCl on Polymer	% Ash on Polymer
Unwashmilled			
GR-S 1.25% Clay	55	0.0075	0.95
GR-S 1.25% Clay	81	0.0084	0.95
GR-S 1.25% Clay	56	0.0099	0.98
Washmilled 5 Minutes			
GR-S 1.25% Clay	55	0.0069	0.73
GR-S 1.25% Clay	81	0.0033	0.72
GR-S 1.25% Clay	56	0.0054	0.90
GR-S No Clay	77	0.0690	0.19
Washmilled 10 Minutes			
GR-S 1.25% Clay	55	0.0060	0.76
GR-S 1.25% Clay	81	0.0024	0.92
GR-S 1.25% Clay	56	0.0036	0.89
GR-S No Clay	77	0.0480	0.13

was found that the proper use of a protective agent, especially Dixie clay, resulted in a very low electrolyte product.

It was originally thought that a finer clay, such as Bentonite, would be more effective as a protective agent. Although the danger of high water absorption argued against the choice of such a material, Bentonite was investigated and found to be actually inferior to Dixie clay in reducing the electrolyte content.

The superiority of Dixie clay in both salt-acid and alum coagulation is demonstrated by the results in Table II which were obtained from gallon sample coagulations. The beneficial effect of extraction of the fatty acid with alkali is also evident.

The method of protective agent addition was investigated in a series of small size coagulations of GR-S latex with salt-acid followed by extractions of the polymer with alkali. The results reported in Table III indicate somewhat better electrolyte removal if the protective agent is in the latex.

In order to find the optimum amount of clay necessary, small size coagulations were made using a salt-acid coagulation with a GR-S latex. The results are shown in Figure 1, from which it is apparent that the use of 1.25 per cent on the polymer was nearly optimum.

Production Trials with Clay Addition (Batch Coagulation)

On the basis of the results of the small size salt-acid-clay coagulations, several batches were made on a production scale. A level of 1.25 per cent Dixie clay was used on the polymer in view of the results shown in Figure 1. Table IV shows the value of alkali extraction in decreasing both the per cent electrolyte and ash on the polymer. (Simultaneous creaming and coagulation were accomplished in 2.5% brine over a period of an hour. Alkali extraction at 60° C., followed by two 60° C. water washes at pH 10 and a final water rinse completed the removal of the fatty acid.)

Washmilling reduces the water in a wet coagulum and accomplishes some washing. Therefore tests were run to evaluate this finishing process in conjunction with the clay protected coagulation of GR-S. The relatively minor effect of washmilling on the reduction of electrolyte and ash content when clay coagulation is used is shown in Table V.

Since the soft water used in production coagulations contain 0.22% electrolyte, it can be seen from the lowest results obtained in Table V that a further reduction in electrolyte content can be accomplished only by using a purer water in the process. Heat loss experiments showed 25% water in washmilled sheets on the dry basis. Unpressed crumbs may hold as much as 300% water.

Polymer Evaluation

Although the presence of excess soluble electrolyte in GR-S was known to be deleterious to both water absorption and electrical resistivity, the effect of variations in the range of 0.005% to 0.15% had to be determined. A number of samples were selected with low electrolyte content for comparison with various standard polymers.

Two types of compounding recipes were used:

1. Typical cable insulation compound
2. Pure gum recipe

The physical properties of the pure gum vulcanizates were, of course, very poor, but it was felt that water absorption and electrical resistivity values would be

TABLE VI—ELECTRICAL AND WATER ABSORPTION PROPERTIES

	(1)[a]	(2)	(3)[b]	(4)	(5)	(6)	(7)	(8)
Coagulant	Alum	Alum	Salt-acid	Salt-acid	Salt-acid	Salt-acid	Salt-acid	Salt-acid
Protective Agent	None	5% Clay	None	None	5% Clay	None	None	1.25% Clay
Alkali Extraction	No	No	No	Yes	Yes	No	Yes	Yes
Washmilling	No	No	No	No	No	Yes	Yes	Yes
% NaCl	0.16	0.02	0.52	0.11	0.007	0.22	0.07	0.005
Cable Recipe								
Water abs., 14 da. R.T.	1.1	0.9	2.4	1.4	1.4	1.4	0.9	0.9
(% wt.), 14 da. 70° C.	1.6	3.9	12.2	5.5	2.0	3.1	3.7	1.5
Dry vol. Res.,* R.T.	15	15	14.4	15	15	15	15	15
90° C.	10.9	11.6	11.6	12.7	12.7	11.2	12.7	12.6
Wet vol. Res.,* 2′	11.0	...	11.7	12.7	13.2	11.8	...	13.0
60′	11.2	...	11.6	13.1	13.2	11.6	...	13.1
1 day	11.5	...	11.7	13.1	13.0	11.7	...	13.0
7 days	...	...	...	13.1	13.1	...	...	13.3
Gum Recipe								
Water abs., 14 da. R.T.	3.6	3.1	7.9	3.8	2.3	4.8	2.6	3.1
(% wt.), 14 da. 70° C.	3.2	6.9	26.1	8.2	4.6	4.5	5.2	3.3
Dry vol. Res.,* R.T.	15	15	15	15	15	15	15	15
90° C.	11.9	12.3	12.9	13.6	13.6	12.4	14.4	14.3
Wet vol. Res.,* 2′	12.1	12.6	13.1	13.0	...	12.6	...	14.3
60′	12.2	12.2	13.1	12.9	...	12.7	...	13.6
1 day	12.0	12.1	13.0	13.4	...	11.5	...	12.5
7 days	12.4	12.2	12.7	13.4	...	12.0	...	12.5

* Resistivity values are log 10. [a] GR-S AC (Production). [b] GR-S (Production).

more indicative of actual polymer differences. Recipes used were:

Pure Gum

Polymer	100.
Lead Oxide	10.
Sulfur	2.

Cable Insulation

Polymer	100.
Zinc Oxide	10.
Sulfur	2.
Agerite White	1.
Stearic Acid	1.
2-Mercapto Thiazoline	1.
Accelerator 808	0.25
Mineral Rubber	40.
Atomite Whiting	40.
Refined Paraffin Wax	1.

The following tests were run on the vulcanizates:

1. Water absorption (ASTM)
   % Increase in weight after 14 days at
   a. Room temperature (25-30° C.)
   b. 70° C.
2. Dry DC volume resistivity (ASTM 6″ disc) at
   a. Room temperature
   b. 90° C.
   Reported in ohms per cm. (often called ohms-cm.)*
3. Wet DC volume resistivity (special pocket sample) at 70° C. after 2′, 60′, ⅓ day and 7 days.
   Reported in ohms per cm. (often called ohms-cm.)*

(*For convenience, the Log_{10} of the resistivity is reported in the tables.)

Wet volume resistivity measurements are usually quite difficult because of small imperfections in the sample and condensate formation on the insulated leads. Consequently the data on this property are incomplete for several of the samples.

Table VI contains a compilation of representative water absorption and electrical data. It can be seen that the presence of only half a per cent soluble electrolyte in GR-S (3) resulted in very high water absorption values. This is the lowest soluble ash content found in standard salt-acid GR-S production. It usually approaches one per cent. Alum coagulated GR-S (1) has much lower water absorption values but electrical properties are not outstanding, even when as much as 5% clay is used in the coagulation (2). It is interesting that as much as 5% clay could be tolerated without seriously impairing water resistance.

The removal of fatty acid from the polymer (4) improved markedly both water absorption properties and electrical resistivity, and the use of as much as 5% clay during coagulation (5) further improved water resistance of the polymer.

Washmilling of an unextracted GR-S polymer (6) im-

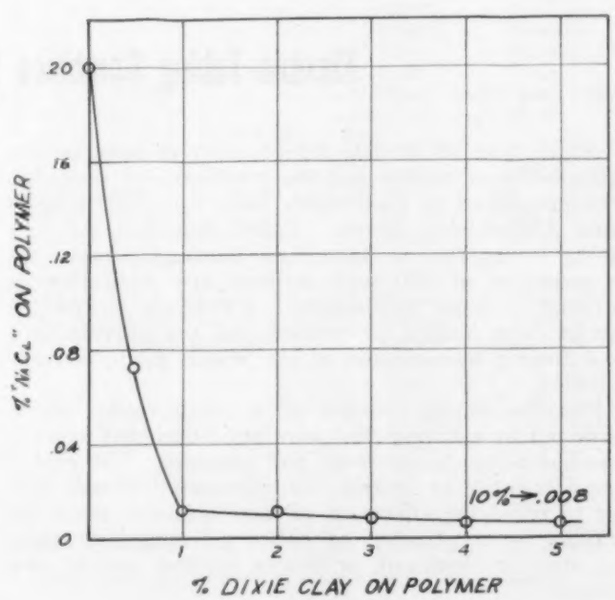

Figure 1.

proved water absorption properties as much or more than alkali extraction (4) but electrical properties were no better than those of production GR-S (3). However, washmilling of an alkali-extracted polymer (7) improved electrical properties considerably.

The combination of coagulation in the presence of Dixie Clay, alkali extraction of the coagulum, followed by washmilling, gave a GR-S polymer (8) with water resistance equal to GR-S AC and electrical properties superior to it. From this limited data it is not evident what degree of improvement in electrical properties may be expected in practice from a reduction of the soluble electrolyte below one to two-tenths of a per cent.

Theoretical Discussion

The action of protective agents in reducing the electrolyte content of the polymer can be reasonably explained on fundamental colloidal theory. It is known that the use of such materials is effective in obtaining uniform fine crumb coagulations. It is logical to assume that this action can go much further and create a more porous or permeable crumb, especially if a "creaming process" is used from which to build the final coagulum.

Exhaustive water extraction fails to remove material quantities of electrolyte from even fine crumb coagulations (beyond a limiting value) if no protective agent is present. This indicates that the electrolyte becomes sealed into polymer "vessels" as syneresis of the crumb proceeds. The uniform dispersion of a hydrophilic material which is stable on the acid side can be thought of as maintaining channels throughout the coagulum and resisting the process of syneresis for at least a time, during which diffusion can proceed.

Several factors influence the efficiency of the protective agent in its ability to produce and maintain this "permeable crumb." Conditions which promote the syneresis of the latex particles, especially during the initial coagulation, must be avoided. Low temperature coagulation, stripped latices, tougher polymers, "small crumb" coagulation conditions (high salt, high pH coagulation, careful addition of low concentration acid, etc.), and short soap conversion times should all tend to develop uniformly small and permeable crumbs which would be subject to efficient extraction of electrolyte.

The fact that under conditions far from those indicated above, exceptionally good washing was obtained in production scale is a tribute to the effectiveness of the method and material used. It should be noted that alkali extraction resulted in marked improvement of the washing process and that poorly controlled coagulations were not especially good until they were alkali extracted. This is probably due to a removal of the permeability by the rapid coagulation, but it is also well to note that when the crumbs were allowed to stand for some time before extraction (small scale extractions of the production charges) the removal of electrolyte was not nearly as effective. These factors should best be controlled in continuous coagulation processes, where hold-up times could be reduced to a minimum.

Irrespective of the degree of improvement in electrical properties to be realized from this process, it is worthy of consideration for several reasons. A more uniform and smaller average crumb size should be possible in the presence of a protective agent. The greater permeability of the crumb should also have a beneficial effect on the drying rate of the polymer. The reduction of soluble electrolyte in American-made rubbers should be conducive to even greater uniformity. The inclusion of clay in such small quantities should not be open to serious objection. This is especially true in extracted polymers, where nearly a third of the added material is eliminated. Dixie clay was chosen for its "inert" qualities in polymer compounding.

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Flexible Tubing Combines Rubber and Steel Wire Braid

A NEW type of flexible tubing, said to combine the flexibility of rubber and the sturdiness of steel, has been introduced by the Penflex Sales Co., 7200 Powers Lane, Philadelphia, Penna. Called Ronaflex, the new tubing is reported to have been thoroughly tested up to pressures of 980 p.s.i. without any indication of bursting, leakage or damage. Extremely flexible, it can be bent, kinked, or twisted, and yet provide safe, free flowing transmission of air, water, gases, oils and volatiles.

Ronaflex tubing consists of a tough rubber sleeve protected by a strong steel wire braid designed to withstand abrasion, severe wear and pressure. The rubber sleeve is made of specially compounded synthetic rubber to resist the effects of oil and volatiles, while the braiding is constructed of either galvanized or stainless steel or aluminum or bronze to meet specific conditions.

To make the assembly even more useful to industry, Ronaflex tubing can be secured with high-speed, snap-on couplings that can be connected and disconnected in one easy operation in approximately one second, according to the manufacturers. The coupling itself is precision-made of aluminum to resist rust, corrosion and heavy wear whenever frequent disconnection is required. Test results are reported to indicate that constant vibration and pressure will have no effect on these couplings, assuring safe service when handling inflammable materials.

Easily adaptable, the new tubing assemblies are said to be ideal for economical time-saving service on a wide variety of industrial uses, including fuel and oil lines for engines, machine tool coolant lines, butane-propane gas lines, paint spraying air lines, for rapid testing operations, for domestic portable gas heaters and household appliances, and for numerous other applications.

THE S-POLYMERS

A New Type of Thermoplastic Resinous Polymer

By E. N. CUNNINGHAM

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THE S-Polymers are a new type of thermoplastic resinous polymer manufactured by the Standard Oil Co. of New Jersey and marketed by Enjay Co., Inc. They are copolymers of styrene and isobutylene combined by the low temperature technique similar to the process used for making Butyl.

Recently, production quantities were made in Canada where equipment was available and these polymers are now available in the United States for large scale development work. Present plans are to manufacture this product on a scale sufficient to permit large volume usage when their industrial utility has been demonstrated.

During 1946, pilot plant samples of the S-Polymers, formerly designated as "Stylene," were submitted to approximately 500 prospective customers for evaluation. The interest expressed by these companies led to a decision to launch commercial production even though production capacity was not yet available in the United States.

Two grades were made in the first large scale production trials—S-50 and S-60. The S-50 is a softer and more elastic polymer than S-60. The S-Polymers are packaged in granular form in a corrugated paper carton which contains approximately 40 pounds. The granular form makes for convenient handling of the polymers, rapid solution in solvents and easy blending with other materials.

The S-Polymers have a unique position in the realm of thermoplastics and resins since they can be used alone as a plastic or combined with other plastics as an alloying or modifying agent. They have plastic properties, yet exhibit rubber-like characteristics such as extensibility and recovery. They can be combined with Hevea and synthetic rubbers to improve processability, increase water vapor and gas barrier properties and modify other physical properties. They can be used as wax blending agents, combining readily in hot melts.

Physical Properties

The physical properties of the new polymers are interesting as follows:

	S-50	*S-60*
Specific Gravity	0.96	0.93
Heat Softening Point	45°C.	60°C.
Tensile Strength	2000 psi	3000 psi
Ultimate Elongation	400%	200%
Hardness Shore A	50-60	80-90
Rockwell	.....	M-10
Intrinsic Viscosity	0.7 to 0.8	0.7 to 0.9

Above temperatures of 45°C. and 60°C. to about 80° to 90°C., there exists a period of thermoplasticity followed by true plastic flow. At about 400°C. the polymers decompose (see Figure 1).

The tensile strength of S-Polymer compares favorably with plasticized polyvinyl chloride or cellulose acetate. The extensibility or elongation is considerably higher than the usual thermoplastic.

Low water vapor transmission is one of the outstanding properties which has created considerable interest in S-Polymer as a packaging material. Independent laboratories have reported the water vapor transmission to be as low as any thermoplastic tested (see Figure 2):

TABLE I—PHYSICAL PROPERTIES OF S-50 AND S-60

Properties	*S-50*	*S-60*
Molding Qualities	Good	Excellent
Compression Molding Temp., °F.	280-340	300-360
Compression Molding Pressure, p.s.i.	300-2000	300-2000
Injection Molding Temp., °F.	....	300-375
Specific Gravity	0.96	0.93
Tensile Strength, p.s.i.	2000	3500
Elongation, percent	400-600	200-300
Compressive Strength, p.s.i.	.....	>16,000
Flexural Strength, lbs./in.	.....	>4,000
Impact Strength ft. lbs./in. notch:		
Izod—cantilever beam	.....	.3
Charpy—simple beam	.....	>10
Hardness, Rockwell	.....	M-10
Coefficient of Cubical Expansion $cm^3/cm^3/°C.$	1250×10^{-6}	1275×10^{-6}
Distortion under heat, °C	.....	40
Dielectric Strength volts/mil	500-700	500-700
Dielectric Constant 10^3 cycles	2.3-2.4	2.3-2.4
Power Factor 10^3 cycles	0.00035	0.00035
Water Absorption, % by wt.	0.1-0.12	0.1-0.11
Burning Rate	Fast	Fast
Effect of Sunlight	Very Slight	Very Slight
Heat Softening Point, °C	45-55	60-65
Moisture Vapor Permeability, gm. H_2O/100 sq. in./24 hrs. for 4 mil thick	0.3	0.8
Gas Permeability, Hydrogen liters/sq. M./24 hrs. @ 25°C.	2.2	2.0
Effect of Weak Acids	None	None
Effect of Strong Acids (non oxidizing)*	.....	.....
Effect of Weak Alkalies	None	None
Effect of Strong Alkalies	None	None
Effect of Organic Solvents	Soluble in: aromatics, aliphatics, halogenated hydrocarbons, ketones.	Soluble in: aromatics, aliphatics, halogenated hydrocarbons, ketones
Machining Qualities	Poor	Good
Clarity	Slight opalescence	Slight opalescence
Color Possibilities	Unlimited	Unlimited

* Nitric acid reacts with the polymers to render them insoluble.

Note: This paper is one of several given at the Symposium on Synthetic Resins Used in Compounding Natural and Synthetic Rubbers held by the New York Rubber Group in New York City on October 24, 1947.

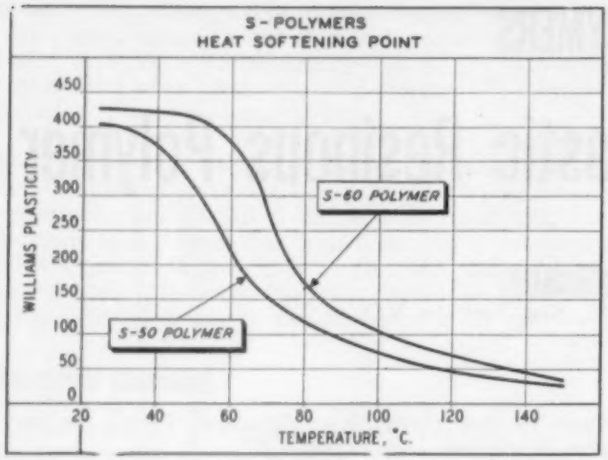

Figure 1.

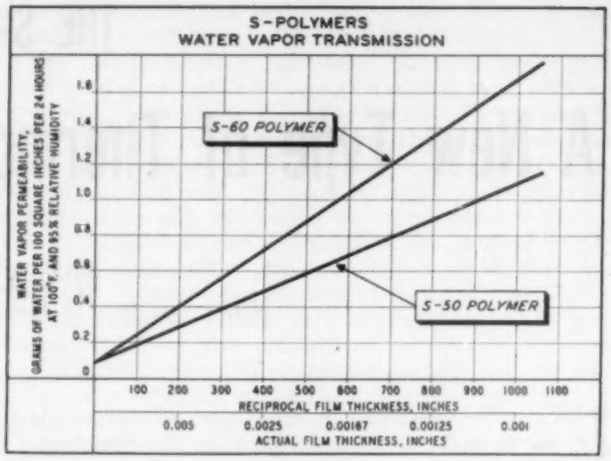

Figure 2.

	S-50	S-60
Grams H_2O per 100 sq. in. 24 hrs. at 100°F. and 95% R. H. Thickness 4 mils.	0.3	0.8

The impermeability to gases is another of the remarkable characteristics which has attracted attention. The diffusion rate for hydrogen through a film 10 mils thick is about 2 liters per square meter per 24 hours at 25°C., which rates the S-Polymers in a class with polyethylene and about two times better than Butyl (see Table III). The rating is of the same order for nitrogen and carbon dioxide.

Low water vapor transmission and low water absorption coupled with good electrical properties have stimulated interest in the S-Polymers for insulation. This includes its possible use alone or in combination with polystyrene, polyethylene or polyisobutylene with which they blend easily. The fact that the S-Polymers go into solution readily in the hydrocarbon waxes and oils points to their use in cable flooding compounds and impregnating mixtures. Electrical properties include:

Dielectric constant.....10^3 cycles 2.3 to 2.4
Power factor .....10^3 cycles 0.0004 to 0.0006

The S-Polymers are exceptionally stable to sunlight and ultraviolet light (see Table II). Ultraviolet light aging for a period of one week has little effect upon tensile or intrinsic viscosity. Outdoor exposure tests place the S-Polymers in a class with the plastics considered to be extraordinarily good where weather aging is to be considered.

The heat stability of the S-Polymers is remarkable. Laboratory milling of S-60 Polymer for seven and one half hours at 300°F. reduced the intrinsic viscosity from 0.81 to 0.71 which indicated very little change in molecular weight. Milling at temperatures in the range of 110 to 150°F. will result in breakdown or molecular degradation and therefore processing temperatures above 200°F. are recommended.

While discussing physical properties, the relatively low coefficient of cubical expansion should be mentioned:

S-50 ..... 1250×10^{-6} $Cm^3/Cm^3/°C$
S-60 ..... 1275×10^{-6} $Cm^3/Cm^3/°C$

Chemically considered as completely saturated polymers and not vulcanizable, interesting chemical derivatives of the S-Polymers can be made; i.e., nitrated with strong nitric acid, sulfonated with strong sulfuric acid, chlorinated with chlorine gas and alkalated with hydrocarbons.

Processing Operations

The processing of the S-Polymers can be carried out on conventional plastic or rubber working machinery. Banbury or mill mixing is entirely feasible at temperatures between 200° to 300°F.

The relatively low coefficient of cubical expansion coupled with the thermoplastic properties permits extrusion and calendering to close dimensional tolerances. Extrusion temperatures of 300° to 325°F. with a die temperature of 150° to 160°F. have been found to be quite satisfactory. Calender temperatures of 280°F. are generally considered to give satisfactory calender performance and impart the best properties to the film.

TABLE II—EFFECT OF ULTRA-VIOLET LIGHT ON S-POLYMER

	S-50	S-60
Original Physical Properties:		
Intrinsic viscosity in Toluene	.93	.68
Tensile p.s.i.	2000	2200
Ultimate Elongation percent	400	200
Aged in Ultraviolet light 168 hours:		
Intrinsic viscosity	.72	.57
Intrinsic viscosity retained percent	78	84
Tensile p.s.i.	1700	2000
Tensile p.s.i. retained percent	86	88
Ultimate Elongation	350	100
Ultimate Elongation retained percent	87	50

TABLE III—PERMEABILITY OF UNSUPPORTED FILMS OF S-POLYMERS TO HYDROGEN. COMPARISON WITH OTHER MATERIALS

	Liters Sq. Meter 24 hrs. 10 mils thick at 25°C.	Relative Permeability
S-60 Polymer	2.0	1
S-50 Polymer	2.2	1
Polyethylene	2.1	1
Butyl	3.9	2
GR-M	6.6	3
GR-S	19.7	10
Hevea	25.0	13

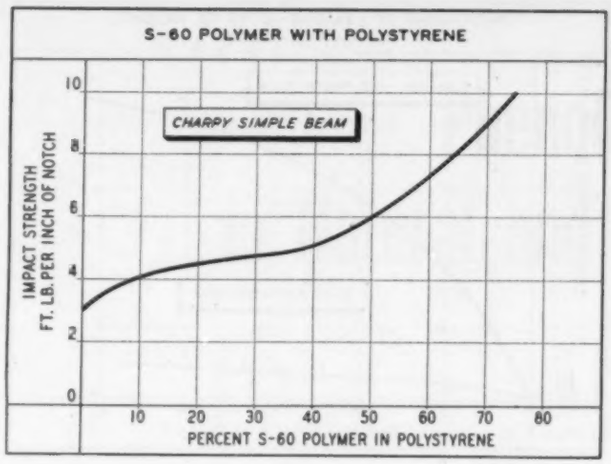

Figure 3.

The addition of 0.5 to 1.0 per cent of Acrawax, octadecylamine or other parting agent is recommended.

S-Polymers are soluble in aliphatic and aromatic hydrocarbons and chlorohydrocarbons. Non-homogenous solutions or organosol type solutions can be made with ketones and acetates. These polymers are soluble in fatty acids such as oleic and stearic which is considered as one of the limitations on their use in the packaging field. They could not be used for packaging such products as cosmetic creams containing mineral oil or for edible fats like oleomargarine.

Hot melts can be made by stirring the S-Polymers directly into the hot wax. In this case it is much easier to put them into solution than polyisobutylene. Heavier wax mixtures can be made in kneaders.

The S-Polymers are completely compatible with Hevea rubber. Evaluation work on this type of blend has not been carried as far as the possibilities of the polymer indicate. However, modification of Hevea with the S-Polymers should be investigated for improvement of moisture vapor and gas permeability, sunlight aging, and processing.

TABLE V—HOT MELT COATINGS
(S-50 POLYMER ON KRAFT PAPER)

	1	2	3	4
S-50 Polymer	100	100	100	100
Acrawax B.	3	3	3	3
Microwax M.P. 170-175°F.	100	300		
Paraffin Wax M.P. 135°F.			100	300
Coating Temperature, °C.	150	150	150	150
Weight of Coating pounds per ream 500 Sheets 24" x 36" (3,000 sq. ft.)	32	31	36	40
Tear Strength (Elmsdorf) p.s.i.				
Untreated paper, control	4.1	4.1	4.1	4.1
Coated paper	6.1	6.8	7.6	11.6
Weight of coating pounds per ream.	32	16	36	40
Moisture Vapor permeability grams of H_2O per 100 sq. in. per 24 hrs. at 100°F. and 95% relative humidity	0.11	0.33	0.57	0.19
Moisture Vapor Permeability sample creased grams of H_2O per 100 sq. in. per 24 hrs. at 100°F. and 95% relative humidity	0.13	1.13	0.73	0.14

S-60 Polymer is compatible with balata in a 25% polymer-75% balata ratio. The resulting film is slightly opalescent and very tough. This suggests that the S-Polymers may fit into the processing operations where balata needs to be extended or modified.

The S-Polymers are compatible with GR-S, GR-I, and the nitrile rubbers such as Perbunan. The chief function is to aid in processing, to improve the light stability, lower the rate of diffusion of gases or water vapor, and to modify the specific uses.

One important field where the S-Polymers have an application is as a processing aid in Perbunan-Vinyl blends. Table IV presents data taken from a recent paper by Young, Newberg, and Howlett on the combination of S-Polymers with Perbunan-Vinylite VYNW blends. The improvement of processing is noticeable in the extrusion rates and in the improvement of crescent tear. It is also notable that the oven aging is not impaired and in some cases improved by this type of blend.

TABLE IV—COMBINATION OF S-POLYMERS WITH PERBUNAN-VINYLITE VYNW BLENDS

Base Recipe—Parts by Weight

Vinylite VYNW	100.0
Perbunan 35NS90	50.0
Basic Lead Carbonate	3.0
Stearic Acid	1.5
S-Polymer	Varied (See Table)
Dioctyl phthalate	Varied (See Table)

Recipe Number	1	2	3	4
S-50 Polymer	....	10	25	25
Dioctyl Phthalate	....	....	....	25
Tensile, p.s.i.	2900	2500	2000	1700
Ultimate Elongation, percent	290	140	190	310
Instantaneous Hardness (Shore A)	94	95	94	88
Crescent Tear, Room Temp., lbs. per inch	480	560	500	280
Extrusion Rate (Royal #½) 220°F. Screw Speed 80 R.P.M. Die 0.4 inch Pin 0.3 inch. Inches per minute	Could not extrude	62	52	56
Extrusion swell index	....	1.8	1.4	1.2
Appearance		Smooth		
Low Temperature Brittleness Point (Bell Tel.)	—40°F.	—30°F.	+20°F.	—20°F.
Oven Aging 6 days @ 250°F. Circulating Air:				
Tensile p.s.i.	4050	3350	2900	2100
Elongation percent	20	20	110	110
Hardness	84	81	92	80

TABLE VI—PROPERTIES OF S-POLYMER EXPOSED TO CHEMICALS SEVEN DAYS AT ROOM TEMPERATURE
(MOLDED SLABS)

Chemical	S-50 % Wt. Change	S-50 Polymer Appearance	S-60 % Wt. Change	S-60 Polymer Appearance
Sulfuric Acid 30%	+ .1	O. K.	+ .1	O. K.
Sulfuric Acid 3%	+ .2	O. K.	+ .2	O. K.
Sodium Hydroxide 1%	+ .08	O. K.	+ .05	O. K.
Sodium Hydroxide 10%	+ .2	O. K.	+ .1	O. K.
Methanol 99.8%	+ .2	O. K.	+ .4	O. K.
Methanol 50%	+ .2	O. K.	+ .2	O. K.
Acetone	+32.7	Soft, gummy	+32.	Very gummy
Ethyl Acetate (c.p.)	+93.9	Very distorted	....	Dissolved 48 hrs.
Ethylene Dichloride	....	Dissolved, 8 hrs.	....	Dissolved 8 hrs.
Carbon Tetrachloride	....	Dissolved, 8 hrs.	....	Dissolved 8 hrs.
Toluene	....	Dissolved, 8 hrs.	....	Dissolved 8 hrs.
Heptane	....	Dissolved, 72 hrs.	....	Dissolved 72 hrs.
Sodium Chloride 10%	+ 0.1	O. K.	+ 0.05	O. K.
Distilled Water	+0.70	O. K.	+ 1.2	O. K.
Nitric Acid 10%	+ 0.1	O.K.	+ 0.1	O. K.
Hydrochloric Acid 10%	+0.01	O. K.	....	O. K.
Acetic Acid 5%	+ 0.3	O.K.	+ 0.03	O. K.
Oleic Acid	....	Soluble	....	Soluble
Ammonium Hydroxide	+ 0.3	O.K.	+ 0.1	O. K.
Sodium Carbonate 2%	+ 0.5	O.K.	+ 0.2	O. K.
Hydrogen Peroxide sol. 3%	+ 0.5	O.K.	+ 0.5	O. K.

Considerable experimental work has been done blending S-60 Polymer with polystyrene. Improvement was noted in brittleness (see Figure 3), machinability, and flow properties with addition of S-60 up to 20%. This was accompanied by some reduction in tensile, flexure, hardness, and compressive strength. There was also some indication that the crazing checking was improved. A slight opalescence accompanied the addition of this amount of S-Polymer.

S-50 Polymer can be put into solution in hot paraffin or microcrystalline wax by stirring in the crumbs. Paper can be coated with these hot melts at 150°C. The Elmsdorf Tear Strength is increased from 4 to 6 psi on Kraft paper. Moisture permeability is improved and the flexural strength of the wax coating is increased by the addition of the S-50 Polymer (see Table V).

The S-Polymers can be considered as resistant to most chemicals ordinarily encountered. Weak acids and weak alkalies have no effect; strong acids and strong alkalies have very little effect. They are soluble in organic solvents. The properties of the S-Polymers when exposed to a variety of chemicals are shown in Table VI. Since they are thermoplastic, they would not be considered suitable when used alone for exposure to chemicals at high temperatures.

Possible Applications

One of the interesting uses for which the S-Polymers have been suggested is in the packaging of fruit. A comparative weight loss between lemons coated with a film of S-60 Polymer .0005" thick and untreated lemons is shown in Figure 4. At the end of 21 days, the coated lemons showed weight loss of 2.54%, while the untreated lemons showed a weight loss of 19.2%. The treated lemons were coated with a film deposited from a 10% solution of S-60 in ethyl ether and were stored in a desiccator at 25° to 30°C. using as the desiccant anhydrous calcium sulfate.

The S-Polymers have a possibility of very diversified uses which range all the way from package coatings to

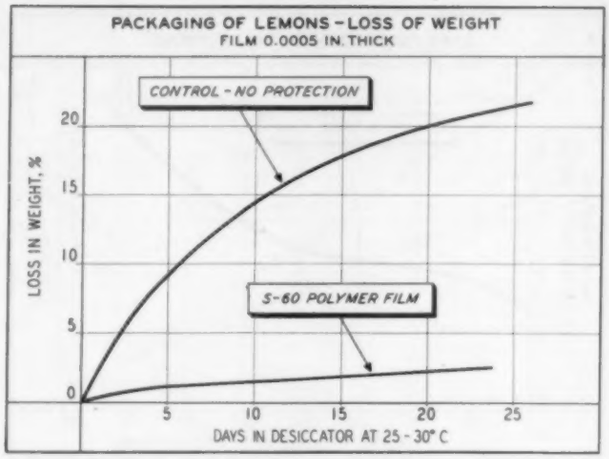

Figure 4.

processing aids for materials to be used in conjunction with other polymers which have extensive uses. The ability to be fabricated and to film films coated on paper and combined with a variety of loading materials over a wide range of colors suggests that they should be very valuable in extending and supplementing the materials available to both plastics and rubber manufacturers.

Experimental work has been done on a number of possible uses for the new polymers. These include the following: acid-resistant clothing, capsules (for aqueous solutions), cellophane coating, coatings and impregnations, electricals (fixtures, plugs, insulation, tubing, etc.), electrotyping plates, food packaging, laminates (fabric, Fiberglas, paper), linings, moisture-proof paper coatings (calendered, cast, hot melt), metal foil coating, recording material, resin modifiers, self-supported sheeting, molded articles (household appliances, toys, etc.), washers, packings, gaskets, rubber modifiers, packaging other resins and polymers, and vacuum packaging.

Status of the Rubber Industry in Nigeria

RUBBER exports from Nigeria and the British-mandated Cameroons increased steadily from 1941 through 1946, with exports of plantation rubber heavily outweighing those of wild rubber. Total exports for the period were as follows: 1941, 2,055 long tons; 1942, 6,667; 1943, 7,366; 1944, 9,413; 1945, 10,519; 1946, 11,448. Whereas wild rubber accounted for 1,818 of the 6,667 tons exported in 1942, it accounted for only 123 of the 11,325 tons in 1946. Total exports for the first four months of 1947 amounted to 2,796 long tons.

According to information reaching the U. S. Department of Commerce, the collection of wild rubber has virtually ceased in Nigeria. Although a small amount was included among total exports for January, 1947, no wild rubber was exported in February, March and April. It is evident that after 1943 the sources of wild rubber were rapidly being worked out. Also, with the end of government buying at high, controlled prices, there has been no incentive to collect wild rubber.

After Government buying ceased, rubber prices in Nigeria dropped precipitously. On June 1, 1947, the United Africa Company, which buys most of the rubber, offered, at its buying stations, 3 pence per pound for A-1 grade sheet rubber, dried and cured, with differentials for lower grades. Later reports indicated that the company was cutting prices much further.

The large plantation companies were reported to be seriously concerned in June, but because of their large investment it was thought they would continue production and attempt to store the output locally, in hopes of a price recovery. At such low prices, it was stated that African growers, who provide half the total output, would simply abandon their trees.

During the war years there was a considerable increase in rubber acreage, and many small African growers planted trees. Known plantation holdings, plus some of the larger African holdings, amounted to 122,461 acres, according to recent figures. Of the total, 2,142 acres were planted with Funtumia, and the remainder with Hevea, divided as follows: Seedling, mature, 94,835; seedling, immature, 24,360; budded, mature, 924; budded, immature, 200.

Phenolic Resins in Natural and Synthetic Rubber

By J. C. SEARER

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PHENOLIC RESINS which have been specifically formulated have two major uses in the rubber industry — rubber compounding and solvent type adhesives—and are now being used in fairly large volume in these fields. The resins useful in the rubber field are not "run of the mill" phenolic resins as used in the many varied phenolic fields but are "tailor-made" for use with the various rubbers.

Plasticizers for Rubber Stocks

These resins offer unique new materials for rubber compounding since they act as thermosetting or vulcanizing plasticizers. They are very efficient plasticizers for rubber during the processing operation, allowing easier processing, higher loadings and excellent extrusions.

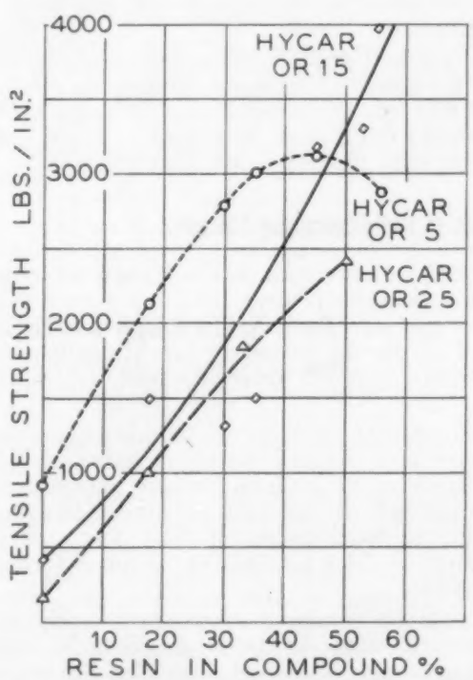

FIG. 1—Tensile strength of Hycar-Durez 12687 stocks containing no sulfur, accelerators or filler.

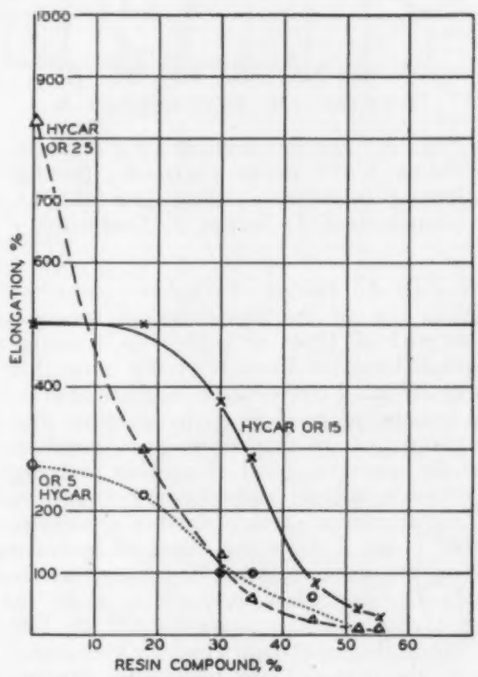

FIG. 2 — Elongation of Hycar-Durez 12687 stocks containing no sulfur, accelerators or filler.

The thermosetting properties of the resins on curing allow material increases in hardness, abrasion resistance, aging resistance, solvent and oil resistance, and stiffness, and give much improved surface finishes to the cured stock. This combination of plasticizing and reinforcing action is rare for a single material and has enabled rubber compounders to manufacture many products more simply than by use of the more conventional materials.

The real point of interest is what phenolics can do for your products, how they are used, and the types of rubber with which they are used. Since there are about as many kinds of rubber today as there are phenolic resins used with rubber, it appears that data on the various resins made by Durez and their effect in the various rubbers will be an effective way of indicating some of the uses of phenolic resins in rubber.

Phenolic resins have been used in large volume with

NOTE: This paper was presented at the "Symposium on Synthetic Resins Used in Compounding Natural and Synthetic Rubber," held by the New York Rubber Group in New York City on October 24, 1947.

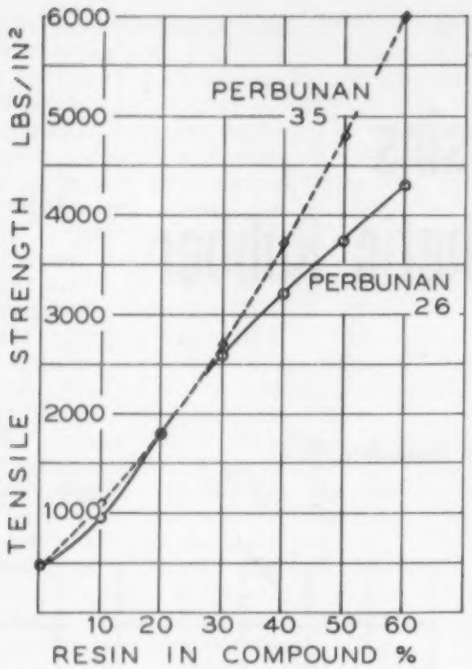

FIG. 3—Tensile strength of Perbunan-Durez 12687 stocks containing the following ingredients: Zinc Oxide, 5; Stearic Acid, 1; Sulfur, 2; Santocure, 1.

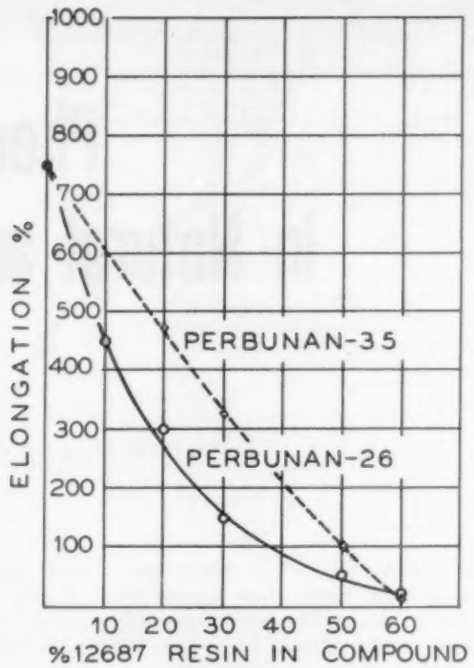

FIG. 4—Elongation of Perbunan-Durez 12687 stocks, with same formula indicated in Figure 3.

Buna N (GR-A) rubber. Complete compatibility with Buna N is one of the properties of special phenolic resins, as with all types of rubber these resins are excellent plasticizers for Buna N giving compounds which process easily in all conventional equipment and are easy to mold because of good flow. In addition, the thermosetting properties of the resins give cured stocks of high tensile strength, good elongation and high hardness. Abrasion, solvent and oil resistance are much improved and excellent surface finishes are obtained.

Figures 1 and 2 show the effect of increasing resin content on the various Buna N rubbers manufactured by the B. F. Goodrich Chemical Co. under the tradename of Hycar. Data is given for OR-25, OR-15 and OR-5. When the resin content of the compound is 50% or less on the rubber these compounds are rubbery or leathery, and as the resin content increases above 50% the compounds begin to resemble ebonite type material. The data shown was obtained on stocks containing no sulfur, accelerators or filler.

Table I shows the effect of increasing amounts of Durez 12687 on the hardness and tensile of stocks containing OR-25 with lubricants as the only other added ingredients.

Figures 3 and 4 show the tensile strengths (Figure 3) and elongation (Figure 4) obtained on stocks from Durez 12687 and Perbunan 26 and 35 manufactured by the Standard Oil Co. of New Jersey. Once again excellent physical properties are obtained.

TABLE I—EFFECT OF INCREASING AMOUNTS OF DUREZ 12687 ON THE HARDNESS AND TENSILE OF STOCKS CONTAINING HYCAR OR-25

(Courtesy, B. F. Goodrich Chemical Co.)

Compound	1	2	3	4	5	6	7
Hycar OR-25	90	80	70	60	50	40	30
Durez 12687	10	20	30	40	50	60	70
Calcium Stearate ..	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Stearic Acid	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Physical Properties of Vulcanizate							
Min. Cure at 325°F.	20	20	20	20	20	20	20
300% Modulus	200	775	1220	....	....	....	....
Ultimate Tensile (psi)	560	1000	1600	1910	2095	....	....
% Ultimate Elongation	675	450	425	150	40	....	....
Hardness (Duro C)	19	31	55	75	84	95	97

Properties of Resin-Containing Stocks

To show the difference obtained when using an ordinary phenolic resin (Durez 175) and a resin especially made for use with Buna N (12687), Table II has been prepared. Note the extremely low strength and hardness obtained with 175 which is a fairly typical phenolic resin.

A full range of products can be made from the Buna N rubbers and phenolic resins, covering such widely varied materials as artificial leathers, which are a distinct possibility of low cost, to ebonite-like materials which are easily compounded, have fast cures and a large range of color possibilities. Typical formulations are available.

The ease of obtaining compounds having a Shore Durometer hardness in the range 85 to 95 with good elongation should be stressed, since phenolic resins make this possible without the necessity of highly loaded stocks.

The phenolic resins have been found useful with GR-S rubber. The excellent plasticizing action of phenolics on GR-S decreases processing difficulties considerably and makes all processing easier including extru-

TABLE II—PROPERTIES OF SYNTHETIC RUBBER COMPOUNDS CONTAINING PHENOLIC RESIN*

	Composition						
	A	B	C	D	E	F	G
Hycar OR-25	100	100	100	100	100	100	100
Zinc oxide	5	5	5	5	5	5	5
Stearic acid	1.5	1.5	1.5	1.5	1.0	1.0	1.5
Sulfur	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Altax	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Durez 12687	.....	50	20	20	75	.....	.....
Durez 175	.....	.....	.....	.....	.....	.....	50
Durez 12707	.....	.....	.....	.....	.....	75	.....
Gastex (SRF)	.....	.....	.....	50	60	60	.....
Original Physical Properties of the Vulcanizate							
Cure at 310° F., min.	30–45	30–45	30–45	30–45	30–45	30–45	30–45
Modulus at 300%	.....	2400	1050–1110	2800	.....	3000	650
Ultimate tensile strength, p.s.i.	300–325	2400–2600	1240–1330	2750–2830	3925–3925	3225–3300	1025–825
Ultimate elongation, %	390–430	300–280	330–340	260–270	40–40	270–210	570–290
Shore hardness of tensile sheet	48–50	92–93	63–64	78–80	98–98	97–97	64–64
Specific gravity	1.03	1.08	1.08	1.17	1.21	1.22	1.08
Properties of 45 Min. Cured Vulcanizate after Aging in Air Oven 70 Hr. at 212° F.							
Ultimate tensile strength, p.s.i.	375	2600	1240	2740	.....	.....	1100
Tensile change, %	+15	0	0	0	.....	.....	+33
Ultimate elongation, %	320	180	280	220	.....	.....	250
Elongation change, %	—26	—36	—15	—15	.....	.....	—14
Shore hardness	49	96	70	82	.....	.....	70
180° bend	OK	OK	.....	.....	.....	.....	OK

* This test information was developed by the Technical Service Laboratory of the Hycar Chemical Company.

sion. In addition to assisting in processing of GR-S, phenolic resins materially increase hardness, toughness, abrasion and heat resistance, and surface finish of cured stocks. They do not materially increase tensile strength.

Phenolic resins are not completely compatible with GR-S and the amount used is usually not over 40% on the rubber with many of the benefits outlined above obtained by use of 10 to 15% of resin on the rubber. The resins used may not be the same as recommended for Buna N.

A few of the applications in which phenolic resins are now being used with GR-S are: shoe soles, top lifts, extruded articles of various types, deep freeze covers, gaskets, and bib washers.

Antioxidant Action in Natural Rubber

Recent experiments have given some indication that phenolic resins act as antioxidants when used with natural rubber. Table III shows the data obtained when comparing a gum stock with no antioxidant with stocks containing 10 and 20% Durez 13714. In addition to the apparent antioxidant properties the resin serves to increase hardness materially. The plasticizing action of the resin gives an easy processing stock.

Phenolic resins are generally not completely compatible with natural rubber and the amount used is usually less than 40% on the rubber with 10 to 20% being the most useful range.

Phenolic resins offer a simple and effective means of plasticizing neoprene rubber during processing and an excellent way of increasing hardness of cured stocks. In general, the resins useful with Buna N are used in neoprene.

The inclusion of special phenolic resins in solvent type rubber adhesives has led to adhesives with better metal adhesion, higher heat resistance, increased strength, and increased toughness. Phenolic resins are being used with all types of rubber in cement formulations today.

Phenolic resins offer a unique material for use in rubber compounding. They can be regarded as thermosetting plasticizers which make processing easier and give cured stocks with excellent physical properties. The use of phenolics is relatively new and much can be gained by trials in various problems. Phenolics are solving difficult problems for some rubber compounders and can probably do the same for many more.

TABLE III—DUREZ 13714 RESIN IN NATURAL RUBBER

(Processed according to A.S.T.M. Procedure)
(Cured at 60 lbs. steam for 10 mins.)

Natural Rubber	100.00
Durez 13714	as indicated
Captax	0.50
Altax	0.50
Methyl Tuads	0.10
Zinc Oxide	5.00
Zinc Stearate	1.10
Sulfur	2.75

	Blank	10 parts 13714	20 parts 13714
Tensile	2860	3430	3380
Hardness	40	53	58
Elongation	1000	750	700
After aging 3 days @ 100° C.			
Tensile	210	2655	2920
Elongation	100	650	650

195-196 Missing

Editorials . . . . . .

Forward Purchasing

THE peculiar relationship between supply and demand and current prices of natural and synthetic rubber is keenly reflected in the Forward Purchasing Plan on GR-S instituted this month by the Office of Rubber Reserve. The latter organization was virtually forced into the adoption of this purchasing plan by reason of recent fluctuations in the demand for GR-S and the cancellation from month to month of varying numbers of Purchase Permits.

The necessity for the plan has deeper roots. When the purchase of natural rubber ceased being a government monopoly and free trade was restored, fairly large quantities of natural rubber were available at prices as low as 15 cents a pound. Due to a number of previously-discussed factors, including the re-entrance of the government into purchasing channels to build up its stockpile of rubber, the price began to climb steadily, reaching 25 cents a pound in the past few days. During this period the price of GR-S remained fixed at 18½ cents a pound.

The last revision of Rubber Order R-1 released the use of natural rubber in all products other than transportation items. The demand for such rubber increased substantially almost immediately, aided and abetted by the fact that the natural product could be purchased for the same or a lower price than GR-S. This increased demand was forecast, but it was expected to be offset by decreased demand from the tire manufacturers. Contrary to all expectations, however, the tire industry as a whole is continuing at near capacity production, and it is evident at this writing that production this year will top 72,000,000 units.

Increased demand for natural rubber was another factor in the rising price of that material. Once that price passed the 22-cent mark, many manufacturers of non-transportation items revised their formulas to include larger quantities of synthetic rubber, available at 18½ cents a pound, and thus maintain profit margins without increasing end-product prices. These various factors resulted in a substantial increase in the demand for synthetic rubber, particularly GR-S.

In accordance with carefully-figured predictions and forecasts with regard to future demand, and with the aim of eliminating all high-cost yield plants, Rubber Reserve several months ago began cutting back the production of GR-S. In addition, the synthetic rubber program is again beginning to conflict with high-octane aviation fuel from the butadiene angle. Therefore, when the demand for GR-S jumped substantially in the past two or three months, Rubber Reserve was unable to fill all such demand, and a tight supply situation in GR-S rapidly developed. It should be emphasized immediately that this situation cannot be laid at the door of Rubber Reserve but rather to the peculiar circumstances outlined above.

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In the final analysis, most of the present trials and tribulations of the rubber industry insofar as its basic raw material is concerned is due to the fact that the industry is experiencing the greatest year in its history. Consumption of rubber, about equally divided between natural and synthetic, will amount to 1,050,000 to 1,070,000 long tons, a new all-time record. New highs are expected to be set in all branches of the industry, except in profits. Mid-year statements and other business gauges indicate that profits will run as much as 10 to 25 per cent under the 1946 peak.

POST-WAR RUBBER INDUSTRY REVIEWED BY P. W. LITCHFIELD

P. W. Litchfield, chairman of the board of the Goodyear Tire & Rubber Company, said recently in a review of the first two postwar years in the rubber industry that the tremendous tire shortage of V-J Day would be filled by the end of the year with the price to consumers less than the 1939 (prewar) list price.

In another of his series of "Notes on America's Ruber Industry," Mr. Litchfield noted that his particular field could look back upon a record of brilliant performance for victory. "A new source of rubber supply had been created and adequate production rates from this source had been achieved in time to avoid national disaster," he stated.

In order to record concrete achievement of the rubber industry in the interests of the national economy and those of individual consumers of rubber, Mr. Litchfield compared the year 1947 against the prewar year of 1939. "Nineteen hundred forty-seven production," he reported, "is at the rate of 20,000,000 more passenger car tires than in 1939; 14,000,000 more truck and tractor tires than in 1939. Today's passenger tires are giving substantially more mileage than those of 1939. They are priced to the consumer at 7 per cent less than the 1939 list prices. The 50,000,000 tire shortage of V-J Day will be completely filled before the end of the current year. In price, quality and output, what American industry can match this record?"

Cites Employment Status

Mr. Litchfield stated that total employment and annual wages in the rubber industry were up practically 100 per cent. He placed the number of production workers at 121,000 in 1939 compared with 224,000 in 1947. He listed the average annual wage as $1,448 in 1939 as against $2,814 for this year.

"In 1939," he added, "the Rubber Industry's tax bill (federal, state and local exclusive of excise) was $13,000,000. In 1945 (the last available statistics), it was $228,000,000". The rubber company executive asserted that "only under the American system of free, competitive enterprise could such significant human progress be achieved," and outlined the peacetime problems in this way:

"Space and facilities which had been used in the production of war items had to be reconverted and reorganized to the goods of peace. Labor had to be retrained. Men flooding back from the service had to be absorbed. War plants had to be closed and new plants had to be acquired."

By using an historic comparison, Mr. Litchfield revealed these cumulative results: Forty years ago a Goodyear tire worker received 40 cents an hour while the price of the tire he built was $35 and could not be expected to give more than 2,000 miles of service—making one hour's work equivalent in value to 23 miles of tire service. Today the tire worker's average hourly rate is $1.63, price of the tire to consumer $14.40 and it can be expected to give an average of 34,000 miles of service—making one hour's work equivalent in value to 3,800 miles of tire service.

Bakelite Cuts Polyethylene Cost

Bakelite Corp., a unit of the Union Carbide & Carbon Corp., 30 East 42 St., New York City, announced on November 12, that effective November 10, prices of Bakelite polyethylene have been reduced from 4 to 7 cents per pound for the various grades. This price reduction is the second for the product in less than six months, and the fourth since mid-1942, bringing the new price level of polyethylene to a point more than 60% lower than it was at that time.

Plant Sold by General Tire

Sale of the physical assets of the plumbing division plant of the General Tire & Rubber Co. in Pasadena, Cal., was disclosed on November 4. The purchaser is the Schaible Co., Cincinnati, Ohio, manufacturers of plumbing fixtures and valves. Officials at General said that the plant had been operated as an interim venture following the end of the war. The original investment was reported to have been $1,000,000.

Authorize New X-Polymer

The only new X-numbered GR-S authorized by the Office of Rubber Reserve since our last report is X-411 GR-S. This polymer, manufactured by Firestone at Lake Charles was authorized on October 8, 1947. It is the same as GR-S-45 AC (X-317 GR-S) except that it is processed at Lake Charles and has a Mooney viscosity of 37.5 to 52.5 and a volatile matter content of 1.0% maximum.

ASME RUBBER-PLASTICS GROUP ANNOUNCES MEETING PROGRAM

The Rubber and Plastics Division of the American Society of Mechanical Engineers will meet Thursday, December 4, at the Chalfonte-Haddon Hall Hotel, in Atlantic City, N. J., in conjunction with the Annual Meeting of the parent society. Two separate sessions will be held, one devoted to rubber and the other to plastics. The plastics session will be held in the afternoon and the rubber session in the evening.

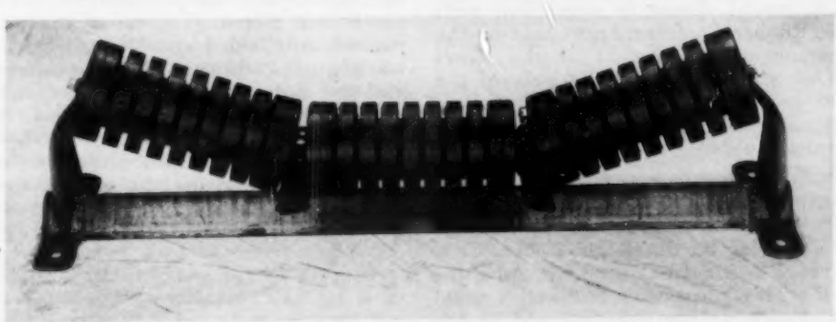
The plastics session will comprise three papers and a symposium. The papers are: *Plastic Tooling Comes of Age*, by L. Wittman of the Republic Aviation Corp.; *Advances in Plastics in 1947*, by J. W. *Underwood* of the General Electric Co.; and *A Phenolic Molding Material under Fatigue, Impact, Creep and Static Loads*, by W. N. Findley of the University of Illinois. The symposium will cover "Non-Metallic Bearings," with at least four experts participating.

Three papers are scheduled for presentation at the rubber session, as follows: *Silicone Rubber—New Properties for Design Engineers*, by George S. Irly, Jr., Wyman Gross, and James J. Pyle of the General Electric Co.; *Rubber in the Automotive Industry*, by Robert K. Williams of the General Motors Corp.; and *Advances in Rubber During 1947*, by V. A. Cosler and S. W. McCune, III, of the DuPont Rubber Chemicals Division.

Plant Closed By U. S. Rubber

The U. S. Rubber Co. halted operations at the government-owned synthetic rubber plant at Institute, W. Va., on November 12, the first to produce synthetic rubber for the Allied war machine. While operations have stopped, the plant will require a considerable number of standby employees to preserve it for possible future use. The property has been placed on the War Surplus list of the Government.

GOODYEAR'S NEW TYPE IMPACT-CUSHIONING IDLER FOR BELT CONVEYORS



Belting engineers of the Goodyear Tire & Rubber Co. of Akron, have developed a new type impact-cushioning idler for belt conveyors, supplementing the company's previous application of pneumatic tires beneath belts to absorb the shock of falling material. Non-pneumatic, the new cushion type idler consists of rubber rings mounted on the idler core instead of the conventional rubber-covered steel idler. By comparison, maximum deflection is about six times greater, according to company officials. Goodyear has contracted to make the molded rubber rings for several belt conveyor equipment firms, and the company believes that the principle will soon be adopted as standard practice by industry in general.

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CURRENT NEWS OF THE MONTH

PLAN NO FURTHER REDUCTION IN PRESENT GR-S PRODUCTION

Government officials on November 6 vehemently denied reports from London that arrangements were contained in the recently concluded Geneva trade pacts under which the United States would cut back its present production of GR-S to permit increased imports of natural rubber.

According to these reports, the pact called for the reduction of synthetic rubber in popular size tires from the present 70% to 25%. The reports caused a considerable jump in the price of natural rubber.

Although no official disclosure has yet been made of the Anglo-American trade pact concluded at Geneva, it is understood that there is a provision in the agreement affecting rubber. This provision is said to be a "rubber rider" which the British insisted be tacked on in return for a concession they made on another product completely unrelated to the rubber situation.

The rider is believed to provide that the British concession goes into effect only when the mandatory use of synthetic rubber in the United States is less than 25% of all rubber used in this country, including reclaimed rubber.

According to Government officials at Washington, the amount of synthetic rubber that could be required under this plan would work out almost exactly the same as present requirements. Present policy, as initially outlined by the former Inter-Agency Policy Committee on Rubber, requires that 33⅓% of all rubber consumed must be synthetic, but the total on which the percentage is based does not include reclaimed rubber. Including reclaim, it was pointed out, synthetic rubber is currently accounting for only about 24% of all rubber consumed, or even less than the figure for 25% cited in the Geneva pact.

These officials estimate that year-to-year variations in the amount of reclaimed rubber used in this country would cause at most a variation of 1 to 2% in the proportion of synthetic and that the United States can meet the "rubber rider" without any change in present policies. As one official pointed out, the United States made no promises with regard to cutting synthetic rubber production but received a concession on another material for using the same amount of synthetic as we are now.

No New Allocation Planned

According to trade reports, the supply of GR-S in the United States has been growing tight in recent months, and this situation has led to reports of new allocation controls. On October 28, Earl W. Glen, Acting Chief of the OMD Rubber Division, stated that despite trade rumors to the contrary, no resumption of allocation controls over GR-S is contemplated.

A review of current supply-demand relationships in synthetic rubber indicates that sufficient quantities to meet total estimated requirements of the rubber industry will be available from the synthetic facilities remaining in operation, Mr. Glen said.

Quarterly requirements have been diminishing, it was pointed out, following revisions of Rubber Order R-1 throughout the year. Specification changes in the September 9 amendment of the R-1 order will reduce still further the proportionate requirements for GR-S, Mr. Glen said, due to elimination of mandatory use of GR-S in non-transportation products, which concentrates future use of the synthetic principally in transportation items.

Flexibility in the operation of GR-S plant facilities remaining active permits sufficient expansion of production to take care of the high level of tire manufacture, which, it now appears, will be sustained through the fourth quarter of this year, it was stated.

Based on the Rubber Division's knowledge of the supply of GR-S and of industry's requirements and capacity to consume this material there does not appear to be justification for resumption of allocation control over the synthetic, Mr. Glen said.

Study Group Active

The special subcommittee of the House Armed Services Committee, which is gathering information for a long-range government rubber program to be presented to Congress early next year, left Washington on November 3 for a two-week inspection tour of the rubber industry. The group, headed by Rep. Paul Shafer, of Michigan, was scheduled to visit Houston, Texas, Louisville, Kentucky, and Akron, Ohio, among other places. The group was scheduled to return to Washington in time for the special session of Congress which opens on November 17.

Fifth National Chemical Exposition

The Fifth National Chemical Exposition, sponsored by the Chicago Section of the American Chemical Society, has been set for October 12 through 16 at the Coliseum, in Chicago, Illinois. It is planned to have the floor plan for the 1948 show in the hands of former exhibitors on January 5, 1948. These exhibitors will have about two weeks in which to select their space before it is thrown open to others. Marcus W. Hilton will again manage the Exposition.

INDUSTRY GROUP TO SUBMIT NEW GR-S RECOMMENDATIONS

It has been learned that new and specific recommendations for a long-term national rubber policy will be submitted to the Armed Services Munitions Committee in the near future by the rubber manufacturing industry. One authority is quoted as having stated that there is tangible evidence of firm opposition to any reduction in synthetic rubber usage at the present time among key government officials and sentiment in the rubber manufacturing field matches this feeling.

The primary consideration guiding government opinion on the subject of alteration of usage controls is of course the question of national security. The recent institution of a more active rubber stockpiling program, still not officially announced, is indicative of the trend in official thought on rubber policy.

Although not yet in its final form, the industry report is believed to include the following:

1. A recommendation that the present ratio of natural to synthetic rubber consumption should not be "disturbed" for the immediate future. The last revision of usage controls, September 9, freed virtually all products, except tires, tubes and associated items from requirements to use stipulated percentages of synthetic rubber. The effect of a further reduction of manufactured rubber usage would therefore be restricted largely to tire manufacturers who customarily absorb about 70 per cent of all rubber consumed.

2. A request for adoption of more efficient accounting procedures by government agencies running the synthetic rubber program. While the report is understood to refrain from any recommendations on synthetic prices, it does ask that the costs of maintaining unused rubber manufacturing capacity in stand-by condition for meeting any national emergency not be added to the costs of plants actually in production.

3. A formula for leaving the way open for eventual purchase of Government owned synthetic plants by private industry.

The problem of a long-range rubber policy, which may be decided at the next session of Congress, has recently been a subject of considerable disagreement within the rubber industry. The manufacturing branch appears to be firmly opposed to any measures which will seriously affect United States rubber-producing capacity.

As an aid to plant managements in training watchmen in the proper procedure when fire is discovered, the Associated Factory Mutual Fire Insurance Companies, Boston 10, Mass., has made available a 12-page booklet under the title of "Watchman, What Would you Do?"

ORR INSTITUTES PLAN FOR FORWARD PLACEMENT OF GR-S

Recent fluctuations in the demand for GR-S, together with the cancellation from month to month of varying numbers of Purchase Permits previously issued by the Office of Rubber Reserve which had been taken into account in developing forward production schedules, have rendered impossible a proper and realistic scheduling by ORR of manufacturing operations at the various plants in the synthetic rubber program.

The result, in view of the small number of plants presently in operation in the synthetic rubber program, has been an inability on the part of ORR to achieve a proper relationship of supply of GR-S to demand and the creation of factors militating against the most economic operation of the program which would otherwise be possible.

In an effort to overcome these difficulties and to insure the availability of the required amounts of GR-S at the lowest possible cost, ORR finds it necessary to institute a plan of forward placement of GR-S orders by purchasers on a firm basis. As a result of such forward purchasing plan, there will be established a contractual relationship between the consumer and ORR covering a definite quantity of GR-S for future delivery and manufacturing operations will be scheduled in order to meet the specified requirement thus resulting. Contracts established in accordance with such procedure will be sure of fulfillment.

If consistent with the reasonable conduct of its manufacturing operations, ORR will also undertake to produce and offer for spot sale GR-S in quantities in excess of those required to meet contracts. As used in this instance, the term GR-S includes GR-S latices.

Major Features of Plan

Major features of the plan, outlined in a letter sent to the rubber manufacturing industry under date of October 30, 1947, include the following:

(1) All consumers who expect to purchase GR-S during December, 1947, and January and February, 1948, and who desire firm delivery commitments for such delivery, should submit purchase requirements to ORR not later than November 12, 1947. Purchase requests for March, 1948, and subsequent months should be submitted not later than the 12th day of the fourth month preceding the month in which delivery is desired.

(2) Issuance of a Purchase Permit by ORR for any month from and after December, 1947, will constitute a firm contract for the sale and delivery of the quantity and type of rubber specified therein at the prices published and prevailing at the time of such issuance. Any increases in present prices will become applicable, insofar as forward sales are concerned, at the end of the third full month after notice of such price increases.

(3) In the event that Rubber Order R-1 is further amended so as to reduce the aggregate minimum quantities of GR-S required to be used in the manufacture of specified end-products, ORR, if so requested, will agree to a reduction in the quantity of rubber covered by existing contracts to the extent that the amended order provides. Such reduction of contract quantities will be effective beginning with contracts for delivery in the first full month after the date of amendment of the rubber order.

(4) Manufacturers may file requests at any time for more than the quantities specified in the forward contracts, and these additional requests will be furnished at the contract price to the extent that supply permits; however, ORR may not be able to supply such requirements since production will be planned against contract amounts.

The procedure outlined above will also be applicable with respect to the purchase of experimental GR-S rubbers presently being produced under "X" number designations. As to the new "X" rubbers which have been produced after November 1, delivery may be obtained on a spot basis within reasonable limits as specified by ORR for a period of time beginning with the initial production of such "X" rubbers until the end of the third full month thereafter. At that time orders placed in accordance with the new plan will be effective.

Coming Events

Nov. 21. Chicago Rubber Group, Morrison Hotel, Chicago, Ill.

Dec. 2. Los Angeles Rubber Group, Xmas Party, Hotel Mayfair, Los Angeles, Calif.

Dec. 5. Philadelphia Rubber Group, Kugler's Restaurant, Philadelphia, Penna.

Dec. 9. Buffalo Rubber Group, Hotel Sheraton, Buffalo, N. Y.

Dec. 11. Quebec Rubber & Plastics Group, Ritz-Carlton Hotel, Montreal, Canada.

Dec. 12. Detroit Rubber & Plastic Group, Detroit-Leland Hotel, Detroit, Mich.

Dec. 12. New York Rubber Group, Xmas Party, Hotel McAlpin, New York, N. Y.

Dec. 12. Boston Rubber Group, Xmas Party, Hotel Somerset, Boston.

Dec. 18. Southern Ohio Rubber Group, Miami Valley Country Club, Dayton, Ohio.

Dec. 19. Chicago Rubber Group, Xmas Party, Hotel Morrison, Chicago, Ill.

Hewitt Rubber has resumed production of its top brand Maltese Cross fire and chemical hose, manufacture of which was stopped during the war because of government restrictions on the use of premium quality materials.

EXPANDING LATEX DELIVERIES PREDICTED BY DR. W. E. CAKE

Natural rubber latex is now being produced in sufficient quantities from Malaya and Sumatra to indicate that expanding deliveries will be maintained, Dr. W. E. Cake, assistant managing director, plantation division, United States Rubber Company, revealed on November 4.

In his first interview after returning from a survey of Far Eastern properties, Dr. Cake disclosed creamed latex concentrate is now being furnished with an analysis of 68 per cent solids, an increase of 3 per cent over past levels, producing three important savings for buyers. These he listed as reduced freight costs, higher dry rubber content, and purer products because non-rubber content has been removed.

All latex processing and storage equipment was destroyed or dispersed by the Japanese during the war, Dr. Cake continued, and has been restored to production this year. Production of centrifuged concentrate, 63 per cent solids, is now at the rate of 5,000,000 pounds of dry rubber per year, while output of creamed concentrate, 69 per cent solids, is now at the rate of 23,500,000 pounds of dry rubber per year.

Demand Still Increasing

Demand for natural rubber latex is increasing, Dr. Cake added, because it is used as a raw material in making foam mattresses, the backing and pile anchorage of rugs and carpets, paper saturation for inner soles of footwear, artificial leather for belts, pocketbooks and book covers, lastex and rubber thread, insulation of electric wire, dipping of tire cord, dipped goods including surgical supplies and prophylactics and adhesives for footwear. Three-fourths of the world production, or 33,437 long tons, dry weight, were imported by the United States in 1940, he said.

The U. S. Rubber Company plantations in Malaya and Sumatra represented a total investment of $38,000,000, including 131,000 acres, three-fourths of which were planted with 10,000,000 trees with a capacity of 75 million pounds of rubber per year, he explained.

In British Malaya the company owned and operated five plantations and a latex loading plant. The company now has 25,853 acres in production in Malaya producing 26,775,817 pounds per year. Facilities there were replaced in production on the following schedule, Dr. Cake declared: At Harvard Estate production of centrifuged latex was resumed April 30 and on creamed latex on Sept. 13; on Dublin Estate, creamed latex output was resumed July 26; at Port Swettenham the latex loading and shipping plant was rebuilt and has now been enlarged by a capacity of 200,000 gallons greater than pre-war.

In Dutch Sumatra, the general association of rubber planters on the East Coast of Sumatra, as custodian, has "entered upon our properties," Dr. Cake reported. In this region, the company also owned five plantations with a latex shipping plant located at Kisaran, Lendeet, Damoeli, Si Pare Pare, Langkat and Belawan, with a total of 72,871 planted acres.

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Cites Employment Status

Mr. Litchfield stated that total employment and annual wages in the rubber industry were up practically 100 per cent. He placed the number of production workers at 121,000 in 1939 compared with 224,000 in 1947. He listed the average annual wage as $1,448 in 1939 as against $2,814 for this year.

"In 1939," he added, "the Rubber Industry's tax bill (federal, state and local exclusive of excise) was $13,000,000. In 1945 (the last available statistics), it was $228,000,000". The rubber company executive asserted that "only under the American system of free, competitive enterprise could such significant human progress be achieved," and outlined the peacetime problems in this way:

"Space and facilities which had been used in the production of war items had to be reconverted and reorganized to the goods of peace. Labor had to be retrained. Men flooding back from the service had to be absorbed. War plants had to be closed and new plants had to be acquired."

By using an historic comparison, Mr. Litchfield revealed these cumulative results: Forty years ago a Goodyear tire worker received 40 cents an hour while the price of the tire he built was $35 and could not be expected to give more than 2,000 miles of service—making one hour's work equivalent in value to 23 miles of tire service. Today the tire worker's average hourly rate is $1.63, price of the tire to consumer $14.40 and it can be expected to give an average of 34,000 miles of service—making one hour's work equivalent in value to 3,800 miles of tire service.

Bakelite Cuts Polyethylene Cost

Bakelite Corp., a unit of the Union Carbide & Carbon Corp., 30 East 42 St., New York City, announced on November 12, that effective November 10, prices of Bakelite polyethylene have been reduced from 4 to 7 cents per pound for the various grades. This price reduction is the second for the product in less than six months, and the fourth since mid-1942, bringing the new price level of polyethylene to a point more than 60% lower than it was at that time.

Plant Sold by General Tire

Sale of the physical assets of the plumbing division plant of the General Tire & Rubber Co. in Pasadena, Cal., was disclosed on November 4. The purchaser is the Schaible Co., Cincinnati, Ohio, manufacturers of plumbing fixtures and valves. Officials at General said that the plant had been operated as an interim venture following the end of the war. The original investment was reported to have been $1,000,000.

Authorize New X-Polymer

The only new X-numbered GR-S authorized by the Office of Rubber Reserve since our last report is X-411 GR-S. This polymer, manufactured by Firestone at Lake Charles was authorized on October 8, 1947. It is the same as GR-S-45 AC (X-317 GR-S) except that it is processed at Lake Charles and has a Mooney viscosity of 37.5 to 52.5 and a volatile matter content of 1.0% maximum.

ASME RUBBER-PLASTICS GROUP ANNOUNCES MEETING PROGRAM

The Rubber and Plastics Division of the American Society of Mechanical Engineers will meet Thursday, December 4, at the Chalfonte-Haddon Hall Hotel, in Atlantic City, N. J., in conjunction with the Annual Meeting of the parent society. Two separate sessions will be held, one devoted to rubber and the other to plastics. The plastics session will be held in the afternoon and the rubber session in the evening.

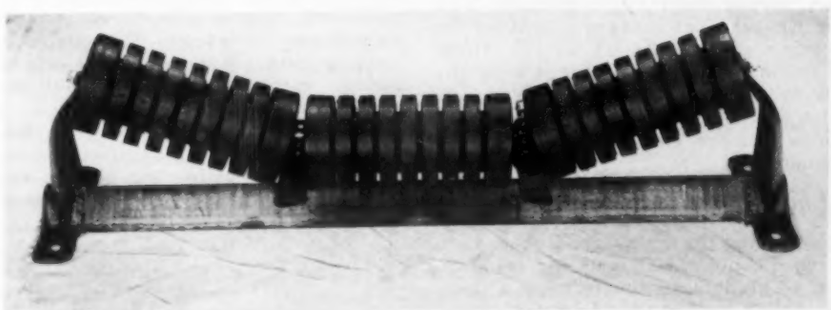
The plastics session will comprise three papers and a symposium. The papers are: *Plastic Tooling Comes of Age,* by L. Wittman of the Republic Aviation Corp.; *Advances in Plastics in 1947,* by J. W. *Underwood* of the General Electric Co.; and *A Phenolic Molding Material under Fatigue, Impact, Creep and Static Loads,* by W. N. Findley of the University of Illinois. The symposium will cover "Non-Metallic Bearings," with at least four experts participating.

Three papers are scheduled for presentation at the rubber session, as follows: *Silicone Rubber—New Properties for Design Engineers,* by George S. Irly, Jr., Wyman Gross, and James J. Pyle of the General Electric Co.; *Rubber in the Automotive Industry,* by Robert K. Williams of the General Motors Corp.; and *Advances in Rubber During 1947,* by V. A. Cosler and S. W. McCune, III, of the DuPont Rubber Chemicals Division.

Plant Closed By U. S. Rubber

The U. S. Rubber Co. halted operations at the government-owned synthetic rubber plant at Institute, W. Va., on November 12, the first to produce synthetic rubber for the Allied war machine. While operations have stopped, the plant will require a considerable number of standby employees to preserve it for possible future use. The property has been placed on the War Surplus list of the Government.

GOODYEAR'S NEW TYPE IMPACT-CUSHIONING IDLER FOR BELT CONVEYORS



Belting engineers of the Goodyear Tire & Rubber Co. of Akron, have developed a new type impact-cushioning idler for belt conveyors, supplementing the company's previous application of pneumatic tires beneath belts to absorb the shock of falling material. Non-pneumatic, the new cushion type idler consists of rubber rings mounted on the idler core instead of the conventional rubber-covered steel idler. By comparison, maximum deflection is about six times greater, according to company officials. Goodyear has contracted to make the molded rubber rings for several belt conveyor equipment firms, and the company believes that the principle will soon be adopted as standard practice by industry in general.

RUBBER CONFERENCE AT SAN FRANCISCO FEATURES INTERESTING PAPERS

A large attendance, composed equally of rubber chemists and technologists and users of rubber products of all types, attended the Rubber Conference held at the Civic Auditorium in San Francisco, Calif., on October 23 and 24. The conference was one of several held in conjunction with the Pacific Chemical Exposition held under the general sponsorship of the California Section of the American Chemical Society. The various conferences were in turn sponsored by numerous organizations, the Rubber Conference being held under the auspices of the Northern California and Los Angeles Rubber Groups.

The exposition itself resembled on a smaller scale the chemical expositions held in New York. There were approximately 125 exhibitors covering the entire range of chemical processing materials and equipment. A booth was maintained by the Special Libraries Association which was manned by experts and which functioned smoothly throughout the full week of the exposition. A continuous movie program was another feature of the exposition, films shown including "Bouncing Molecules," the Standard Oil film tracing the manufacture of synthetic rubber, and "Building of a Tire," the Firestone movie.

Synthetic Rubbers Described

The Rubber Conference got under way on the afternoon of October 23, with a few introductory remarks made by the chairman of the session, L. H. Dimpfl, of the California Research Corp. Two rubber films were then shown, with a commentary on rubber compounding made by Leonard Boiler, of Technical Coatings, Inc.

A series of descriptive talks on various commercially-available synthetic rubbers was then given, the topics and speakers being as follows: *GR-S*, D. C. Maddy (Harwick Standard Chemical); *Neoprene*, Herman Jordan (DuPont); *Hycar*, Ray Bitter (Goodrich Chemical); *Thiokol*, Walter E. Boswell (Thiokol); *Perbunan* and *Butyl*, Irving E. Lightbown (Enjay).

A special dinner in connection with the Rubber Conference was held on the evening of October 23 at the Hotel Whitcomb. George B. Farwell, of the Goodyear Rubber Co., San Francisco, who is chairman of the Northern California Rubber Group, presided at the dinner.

Panel Discussion on Compounding

Following the dinner, the Rubber Conference continued at the Civic Auditorium. This late session featured a panel discussion on compounding and an excellent paper on "Molecular Structure and Mechanical Properties of Polymers" by Herman F. Mark, Director of the Institute of Polymer Research of the Polytechnic Institute of Brooklyn.

The panel discussion, which included questions from the floor, was surprisingly good, primarily due to the fine leading done by Ross E. Morris, of the Mare Island Rubber Laboratory, whose profound knowledge of compounding and quick acting mind contributed to having every question raised from the floor answered satisfactorily.

In addition to Mr. Morris, the following participated in the discussion: Leonard Boller (Technical Coatings), E. B. Reinbold (Pacific Rubber), Don Good (American Rubber), Russell Kettering (Oliver Tire), John Liljegren (Pioneer Rubber Mills), and George Petelin (Goodyear Rubber).

In his talk on polymer structure and properties, Dr. Mark pointed out that during the last twenty years chemists have succeeded in elucidating the structure of high polymeric materials to a certain degree and in establishing relationships betwen this structure and the commercially important properties of these materials. As a consequence of this knowledge, he stated, it has been possible to synthesize polymers for special purposes which are far superior to any materials used for the same purposes previously, such as the natural substances and their earlier stage replacements.

In concluding his talk, Dr. Mark stated that in the not too distant future synthetic fibers, resins and rubbers will clearly outclass the corresponding natural products and will also be available at a cheaper price. Dr. Mark was highly praised for a clear and simplified presentation of a difficult branch of rubber chemistry in words of one syllable.

Snyder Talks on Carbon Black

The concluding session of the Rubber Conference was held on the afternoon of the following day, October 24, with five papers being presented. This session was held under the chairmanship of Curtis R. Wolter, chairman of the Los Angeles Rubber Group.

One of the papers was on Carbon Black and Other Compounding Agents," delivered by B. R. Snyder, of the R. T. Vanderbilt Co. Mr. Snyder first discussed the various compounding agents used in rubber, including vulcanizing agents, accelerators, antioxidants, softeners and fillers. The latter, he explained, are divided into black and non-black groups, the non-blacks including various carbonates, silicates, sulfates, etc., while the blacks are divided, in turn, into channel, furnace and thermatomic types. He then presented the following chart giving the particle size in millimicrons and the coverage in square meters per gram:

	Particle Size (millimicrons)	*Square Meters (Per Gram)*
Channel Blacks:		
Conducting Channel	16	281
Hard Processing Channel.....	24	105
Medium Processing Channel..	28	94
Easy Processing Channel.....	30	80
Furnace Blacks:		
Conducting Furnace	34	78
High Modulus Furnace.....	41	45
Semi Reinforcing Furnace....	81–97	29–23
Thermatomic Blacks:		
Conducting Thermatomic	43	85
Fine Thermatomic	74	23
Medium Thermatomic	274	19

The specific uses of the various blacks, as well as the methods used to produce them, were also discussed by Mr. Snyder.

A talk on "Foam Rubber, Hard Rubber, and Rubber Specialties" was given by R. T. Hickcox, of the Chemical Products Division of the Goodyear Tire & Rubber Co. He discussed the chemistry and processes involved in the manufacture of hard rubber, foamed latex sponge, and several rubber derivatives, and gave the following summary of the most probable reaction mechanisms of the various materials:

Hard Rubber: The hard rubber reaction appears to involve principally the production of thio ether linkages at the double bond to couple adjacent rubber molecules or to produce a thioozonide structure. Substitution reactions are also evidenced by the production of H_2S during the curing reaction.

Foamed Latex Rubber: In this process a predetermined amount of air is whipped into compounded latex to arrive at the proper sponge density. Sodium silicofluoride or similar jellant is added at the end of the frothing period. This hydrolizes to lower the pH causing coagulation of the latex system. The "set" structure is sufficiently strong to support itself during subsequent curing operations.

Chlorinated Rubber: There is good evidence that the chlorination reaction of rubber involves first, substitution, then addition, at the double bond. The usual chlorine content of 65-68% indicates considerable substitution.

Hydrochlorinated Rubber: Hydrogen chloride adds on to the double bond of rubber molecule according to Markowankoff's rule with the chlorine atom adding to the carbon atom containing the methyl group. A final ripening period of hydrochlorinated rubber is necessary to convert the reaction product from an amorphous to a useful crystalline structure.

Cyclized Rubber: In the presence of amphoteric halide acids, rubber cross links at the double bonds. The most probable structure appears to be a six-membered ring containing one double bond per ring. Like the chlorination and hydrochlorination processes, this reaction is carried out in solution. The solvent is steam distilled off after the reaction is completed.

Mechanism of Reinforcement

Dr. L. H. Cohan, director of Research of the Continental Carbon Co. and director of the technical service laboratory of the Witco Chemical Co., delivered an interesting talk on "The Mechanism of Reinforcement of Elastomers by Pigments." Reinforcement is usually associated with high modulus, high tensile, high abrasion resistance, etc., and in this paper Dr. Cohan considered the effect of pigmentation on modulus, tensile, and similar properties.

For pigments composed of symmetrical particles, according to the speaker, the Guth and Gold equation

$$M = M_0 (1 + 2.5V + 14.1 V^2)$$

where M is the modulus of the loaded stock, M_0 is the modulus of the corresponding pure gum stock, and V the ratio of the volume of pigment to the total volume of compound, predicts behavior with

surprising accuracy. For pigments containing unsymmetrical particles or stable aggregates, the equation proposed by Guth for rod shaped particles

$$M = M_0 (1 + 0.67 fV + 1.62 f^2V^2)$$

holds quite well up to about 80 parts loading by weight. In the above equation, f is the shape factor—ratio of the length to the diameter of the rod—and has values in reasonable agreement with electron microscope data. Results indicate that, for pigments of known particle shape, it should be possible to calculate the modulus at various loadings in the commercial range from measurements at one loading only.

Results also indicate that vulcanized natural or synthetic rubber is not adsorbed in appreciable quantities or with sufficient force to be rendered inelastic at the surface of either calcum carbonate or carbon black pigments.

Dr. Cohan suggested that tensile strength is a measure of the force required to separate rubber chains from each other, rather than to break rubber chains and that pigment particles act as cross linking agents holding the chains together. Qualitative predictions based on this concept are in agreement with the behavior of calcium carbonate and carbon black pigments of widely different surface area over a considerable loading range.

Powers Talks on Solubility

"The Solubility of Hydrocarbon Resins and Their Behavior in Rubber Compounds" was the title of a paper given by P. O. Powers, technical advisor of the Battelle Memorial Institute. According to Dr. Powers, the relative solubility of several types of resins can be readily measured by determining their cloud point, the temperature at which the resin becomes insoluble in a reference oil. Cloud points have been measured in some cases over a wide range of concentrations, but are usually measured at a specified high resin concentration.

Since rubber compounds from natural and synthetic rubbers containing coumarone-indene resins of apparently similar properties exhibited striking differences in properties, the cloud points of the resins were determined. The resins examined varied from the most to the least soluble of the commercial resins.

It was found that the cure of natural rubber and GR-S was appreciably retarded in the presence of coumarone-indene resins, the retardation being greater with resins of low molecular weight. Unsaturation is apparently the cause of this retardation. In the case of the nitrile rubber, no retardation was apparent.

Williams plasticity was measured on the compounded stocks using 15, 25, and 35 parts of resin. The plasticity increases with the cloud point of the rubber. A critical cloud point was found at which the plasticity was independent of the amount of resin used within the range of amounts used. This critical cloud point was approximately the same for natural rubber, GR-S, and the nitrile type rubber used.

Hardness of cured, black-loaded stocks increased with the cloud point of the resin in the case of all the rubbers studied. Hardness does not vary with melting point in any regular manner.

Tensile strength, modulus, and elongation vary with the cloud point of the resin employed. The tensile strength and elongation go through a maximum at a relatively low cloud point and further increase results in proportionally lower values. The modulus increases with increase in the cloud of the resin employed. Plastic properties become more apparent with increase in cloud point.

Data on Experimental Polymers

Considerable data on numerous experimental polymers was contained in a paper delivered by Richard E. Harmon, of the Research and Development Division of the Office of Rubber Reserve, under the title of "Development and Availability of Experimental and Special Purpose GR-S Polymers." Mr. Harmon described the functions of the Technical Service Section of his division, clarified the numerous GR-S types, and discussed the factors which control end-product physical properties, such as monomers, reaction temperature, stabilization, emulsification, coagulation and modification.

The speaker made it clear that the Office of Rubber Reserve was ready at all times to cooperate with the industry in the development and eventual production of stable polymers, but pointed out that in order to accomplish such development and production it is necessary for the government agency to know the specific type of developments which interest specific consumers.

Mr. Harmon also explained how an experimental polymer is graduated to the ranks of numbered GR-S types, and noted that 413 experimental (X-numbered) polymers had been scheduled for production in the various copolymer plants operated for the government. Twenty-three of these, he stated, have been promoted into numbered classifications, such as GR-S-10, GR-S-50, etc. This number does not include GR-S latices.

Copies of the 1947 RUBBER RED BOOK are now available. Price: $5.00 per copy.

Data on 21st Exposition of Chemical Industries

Place: Grand Central Palace, New York.

Dates: December 1 to 16, 1947.

Hours: Opens Monday, Dec. 1, at 2 P.M.; open daily thereafter 11 A.M. to 10 P.M., except Wednesday and Saturday when the closing hour is 6 P.M.

Field: More than 350 exhibitors will display materials, instruments, scientific apparatus, machinery and equipment of all kinds, all of interest to the so-called chemical processing field.

Admission: Registration required, but no admission fee or registration charge. The Exposition is not open to the public. Registrants will be required to show invitations or credentials indicating professional or business connections.

EXPORT MARKET IS REPORTED TO BE SHRINKING RAPIDLY

A steady decline in the export boom for rubber products is noted in a recent report by the U. S. Department of Commerce, accompanied by the prediction that the declining trend may be expected to continue for some time. The decline set in after a peak had been reached during the second quarter of the current year. Exports began to fall off in July when the total was considerably less than that for June and well below the monthly average for the second quarter.

According to Commerce Department authorities, foreign nations which have been buying rubber products heavily in this country since the war are returning their own factories to production steadily. They also are once again able to get enough natural rubber of most types on which to run them.

Most of these countries, especially those in Europe, will use their own rubber goods as much as possible and ours as little as possible. Rubber products, however, are among 'essential' items on most of their lists of imports from the United States and will not be removed as soon as others.

Application of the so-called Marshall plan for foreign aid may restrain the decline in rubber goods exports. This cannot be ascertained until the aid-seeking countries present a list of their needs and the position of rubber goods on it can be seen.

Meanwhile, U. S. rubber firms continue to return to production and, in some cases, expand, foreign branch and subsidiaries closed by the war. Some countries are imposing new restrictions on rubber goods imports. Argentina's amounts almost to a ban. Cuba's is stringent. Brazil reportedly is ready to announce similar regulations.

Having shattered all previous records during the first half of this year, rubber goods exports will still continue at an all-time high through 1947, the commerce department predicts. Exports are averaging 8 per cent of total production, compared to 3 per cent during the war. They will total an estimated $190 million this year, against $143 million last year and somewhat more than $36 million in 1939.

But the boom "cannot continue much longer," according to Everett G. Holt, the Commerce Department's leading rubber expert. And evidence of his forecast is to be found in recent figures.

Rubber goods exports totaled $54,790,000 during the first three months of this year and $58,241,000 in the second and peak quarter. The second quarter figure showed a monthly average of $19,400,000. But the total for June was $17,600,000. And July's total was down to $15,960,000.

The July figure clearly forecasts the continuing decline that must be expected, Mr. Holt believes. Tires and other transportation items are accounting for nearly 70 per cent of all rubber industry exports with mechanical goods second and footwear third.

During the second quarter exports of transportation items showed a monthly average of about $13,750,000. The figure for July was $11,304,000.

SYMPOSIUM ON SYNTHETIC RESINS HELD BY NEW YORK RUBBER GROUP

A Symposium on "Synthetic Resins Used in Compounding Natural and Synthetic Rubbers" featured the Fall Meeting of the New York Rubber Group, held on October 24 at the Hotel McAlpin in New York City. Approximately 400 members and guests attended the symposium, with some 270 remaining for dinner and entertainment. In the absence of Simon Collier (Johns-Manville), chairman of the group, Joe Waters (General Cable), the vice-chairman, presided.

Eight talks, each of approximately 15-minute duration, were included in the symposium, each of which was well received by the audience. Titles of the talks, and their authors, follow:

High Styrene Copolymers in Natural Rubber Compounds, K. M. Fox, Dewey & Almy Chemical Co.; *High Styrene Resins in Non-Marking Soles and Heels,* M. E. Jones, Marbon Corp.; *New and Unusual Uses for High Styrene Copolymers in Rubber Compounding,* W. H. Aiken, Goodyear Tire & Rubber Co.; *Coumarone-Indene Resins in Rubber Compounding,* T. A. Bulifant, Barrett Division, Allied Chemical & Dye Corp.

Also, *Phenolic Resins in Natural and Synthetic Resins,* J. C. Searer, Durez Plastics & Chemical Co.; *Rosin-Derived Resins in Rubber Compounding,* C. W. Eurenius, Hercules Powder Co.; *Geon Polyblend,* J. E. Pittenger, B. F. Goodrich Chemical Co.; *The S-Polymers,* E. N. Cunningham, Enjay Company, Inc.

Talks on High Styrene Copolymers

The first three papers, all on high styrene copolymers, actually comprised a symposium within the symposium, the three respective authors approaching the subject from different angles by prearrangement. As indicated by the titles, the papers covered the use of high styrene copolymers in natural rubber compounds, in non-marking soles and heels, and in unusual applications.

Mr. Fox, of Dewey and Almy, was the initial speaker, his subject being "High Styrene Copolymers in Natural Rubber Compounds." He compared two such copolymers, Darex Copolymer X-34 and X-43, in natural and GR-S compounds, and illustrated their effect on such properties as tensile, elongation, hardness, compression set, abrasion, flex life, and low temperature flexibility. The use of these materials in flooring, shoe soles, gaskets, molded and extruded electrical goods and other rubber products was discussed.

According to Mr. Fox, many synthetic resins detract from rubber-like properties such as elasticity, resilience, low permanent set and flexibility, and are usually not as efficient in reinforcing natural rubber as are the more expensive cyclized natural rubber resins. He indicated that Darex X-34, one of the new high styrene copolymers, is outstanding in natural rubber compounds for imparting high hardness and reinforcement together with excellent flex life and abrasion resistance. This material also improves compression set and flexibility of both natural and synthetic rubber stocks, according to the speaker.

The use of high styrene resins in non-marking soles and heels was the topic of the next speaker, M. E. Jones of the Marbon Corp. This talk was based on the application of Marbon S and S-1 in these products which, Mr. Jones stated, makes possible soles and heels possessing wearing qualities far superior to leather. By using these resins, he said, the "boardy or leathery" characteristics can be maintained without being adversely affected by water and aging.

Both Marbon S and S-1, continued the speaker, act as heat plasticizers and processing aids, as well as reinforcing agents, and accordingly it is possible to compound sole and heel stocks in the 90 to 100 Shore A hardness range without the danger of scorching or crumbling encountered when stocks of this hardness are mixed using inorganic fillers. Other advantages claimed by Mr. Jones for these resins included these: when compounds are run on a mill they are of considerable aid in decreasing the "nerve" of both natural and synthetic rubbers; decreased shrinkage of the uncured stock is obtained; improvement is noted in modulus, tear resistance and elongation.

W. H. Aiken, of the Goodyear Tire & Rubber Co., the next speaker, discussed some of the new and unusual uses for the high styrene copolymers in rubber compounding. Basing his talk on Pliolite S-6, he discussed a number of desirable properties added by this material, including reinforcement and increase in tear, tensile, hardness, stiffness and abrasion resistance. In some stocks, he said, elongation is increased. The advantages of the material in electrical goods were also outlined by the speaker, who used numerous samples of end-products to prove his points.

Coumarone-Indene Resins Discussed

The preparation, properties and applications of the coumarone-indene resins were discussed in the next paper by T. A. Bulifant of Barrett. He outlined many of the desirable properties conferred by these resins to both natural and synthetic rubbers in such products as tires, mechanical goods, footwear, soles and heels, wire and cable, proofed goods, and cements and adhesives. He described the coumarone-indene resins as being thermoplastic, neutral and non-saponifiable, resistant to acid, alkali, heat and water. They are soluble in coal-tar solvents and aromatic type petroleum thinners, but are insoluble in alcohols.

Mr. Bulifant stressed the point that the different grades of coumarone-indene resins do not necessarily function alike, although they are all essentially compatible with the various elastomers. They represent a versatile group from which true softeners, extenders and reinforcing softeners may be selected for use in many rubber compounding problems, including applications in hard rubber items and in the reclaimed rubber industry. (EDITOR'S NOTE: Mr. Bulifant's paper will be published in full in our next issue).

In the paper on "Phenolic Resins," J. C. Searer of Durez Plastics & Chemicals, Inc., discussed the two major uses in the rubber industry for which such resins have been specifically formulated, namely, the compounding of rubber and the manufacture of solvent type adhesives. In the latter instance, he said, the inclusion of these special resins has resulted in adhesives with better metal adhesion, higher heat resistance, increased strength, and increased toughness.

In general, according to Mr. Searer, the special phenolic resins offer unique new materials for rubber compounding, since they act as thermosetting or vulcanizing plasticizers. As plasticizers, they allow easier processing, higher loadings, and excellent extrusion. The thermosetting properties on curing allow material increases in hardness, abrasion resistance, aging resistance, solvent and oil resistance, and stiffness, in addition to giving much improved surface finish to the cured stock. (EDITOR'S NOTE: Mr. Searer's paper is published in full elsewhere in this issue.)

C. W. Eurenius, of the Hercules Powder Co., the sixth speaker, talked on "Rosin-Derived Resins in Rubber Compounds," including Stabelite Resin, a hydrogenated rosin, Resin 731, a special disproportionated rosin, and the Dresinols, a series of resin emulsions. According to the speaker, when Stabelite Resin and Resin 731 are incorporated in proper amounts into natural rubber compounds several advantages over ordinary wood rosins are secured, including the fact that there is no depression of modulus when the stock is properly cured, a delaying curing effect being obtained at the same time, and the fact that the resins do not contribute to atmospheric cracking.

The Dresinols, Mr. Eurenius stated, are compatible with animal glue, starch, dextrin, proteins, natural and synthetic rubber latices, polyvinyl acetate, polyvinyl chloride, and water dispersions of phenolic and urea-formaldehyde type resins. When used with such materials they contribute improvements in wetting, penetration and adhesion to polar surfaces, and in many cases improve bonding strength, speed of tack, and other properties. Suggested applications for the resin emulsions were discussed.

Geon Polyblends and S-Polymers

The next paper, on Geon Polyblends, was given by J. E. Pittenger of the B. F. Goodrich Chemical Co. Explaining that these polyblends are specially-prepared mixtures of vinyl resin and nitrile rubber the speaker stressed their versatility from the standpoint that they may be used as a thermoplastic material, as a compounded and vulcanized stock, or as a modifier for other plastics. Suggested compounding methods were then outlined, including the use of stabilizers, fillers, zinc oxide, etc.

Mr. Pittenger also outlined the specific advantages of the Geon Polyblends. He pointed out that they can be placed on a cold mill and processed without initial warming, can be calendered at rubber processing temperatures after initial heat treatment, permit the elimination of plasticizer in natural rubber stocks, and, due to the absence of any plasticizer, remove the danger of plasticizer migration when used in electrical insulation and other products.

E. N. Cunningham, of the Enjay Co., the eighth and final speaker, discussed the

S-Polymers, a new type of thermoplastic resinous polymer manufactured by the Standard Oil Co. of New Jersey. They are copolymers of styrene and isobutylene combined by the low temperature technique similar to the process used for making Butyl Rubber, and can be used alone as a plastic or combined with other plastics as an alloying or modifying agent.

The speaker outlined the physical properties of these new polymers, discussed various processing operations, and concluded with a number of suggestions as to possible applications. The latter included cellophane coatings and impregnation, laminates of various kinds, resin modifiers, self-supported sheeting, packings and gaskets, rubber modifiers, etc. One of the most interesting applications to date, according to Mr. Cunningham, is in the packaging of fruit. (Editor's Note: Mr. Cunningham's paper is published in full elsewhere in this issue.)

Survey Independent Dealers

Goodyear tires are sold by 21.3% of the independent tire dealers who replied to a recent survey conducted by the National Association of Independent Tire Dealers. Compilation of results shows that U. S. tires are the second most popular brand with 18.8%, and Firestone third with 14% of the 1,433 respondents. New tires are sold by 99.4% of the dealers, used tires by 90.6%, batteries by 87.4%, vulcanizing service by 80.9%, spark plugs by 71.8% and tire accessories by 62.9%. Purpose of the survey was to determine the kinds of merchandise and services which independent tire dealers are selling. The return from the questionnaires was approximately 25%, a figure which the association says checks closely with both total vehicle registration and its membership by states.

Rubber Section's New Officers

The Rubber Section of the National Safety Council of America has announced its new officers for the 1947-1948 period. Officers elected include: *General Chairman*, Glen D. Cross (Firestone); *Vice-President in Charge of Program*, T. H. Boyd (Manhattan Rubber); *Secretary*, H. L. Andrews (Firestone); *News-Letter Editor*, Gordon Trank (Hewitt Rubber). Committee chairmen are: *Engineering*, A. A. Wright (Inland Mfg.); *Health*, F. W. Sands (U. S. Rubber, N. Y.); *Membership*, R. M. Boyles (Midwest Rubber Reclaiming); *Publicity*, George Burkhardt (General); *Poster*, M. E. Badstuber (Ohio Rubber); *Statistics*, W. M. Graff (U. S. Rubber, Detroit).

New Home For Enjay Co.

Enjay Co., Inc., previously known as Stanco Distributors, Inc., have moved their offices from 26 Broadway, New York City, to 15 West 51st Street, New York 19, N. Y. Their new telephone number is: COlumbus 5-2700.

Robbins Names Vice-President

Robert L. Moore

Robert L. Moore, formerly of the research department of the Goodyear Tire and Rubber Co. has been named vice-president of research and development of the Robbins Tire and Rubber Company, Tuscumbia, Ala. Mr. Moore has been in research and development of new products for over 30 years, and he holds patents on the thermal decomposition type of carbon. He has specialized in the use of pigments in rubber and plastics.

Enters Rubber Chemicals Field

C. S. Zeigler, general manager of G. S. Zeigler & Co., has announced that his organization has entered the field of compounding ingredients for natural and synthetic rubbers, featuring activation acids, detackifiers and other processing aids, especially cure-activated plasticizers. E. A. Van Valkenburgh, who has had broad experience in rubber manufacturing as well as in the development and sale of rubber chemicals, heads the new division with headquarters in the Woolworth Building, New York City. Zeigler & Co. have extensive laboratory facilities at their compounding plant located in New Market, N. J.

Carlton Touring Continent

C. A. Carlton, technical director of the Rubber and New Products Division of the J. M. Huber Corporation, 342 Madison Avenue, New York 17, New York, is now in Europe on an extensive tour of the continent to survey the European rubber manufacturing industry. Mr. Carlton is interested in observing at first hand the postwar outlook of European tire manufacturers, and to appraise their requirements for carbon black. He is expected to return to the United States on or about November 24.

1947 SYNTHETIC CONSUMPTION TO SURPASS TEN YEAR AVERAGE

Synthetic rubber consumption for 1947 appears certain to pass the half-million ton mark, more than the average total annual consumption of all types of rubbers for ten years prior to World War II. Indications of this trend were found in the monthly consumption report of the Rubber Manufacturers Association for August. The RMA reported that manufacturers had used 389,645 long tons of synthetic rubber in the first eight months of the year. Consumption of synthetic rubber is currently running well over 35,000 tons a month. This would put total use above the 500,000 ton mark by December 31.

Consumption of synthetic rubber during the month of August was set at 38,834 tons while the figure for July was 37,607 tons. For the same period consumption of natural rubber increased from 40,389 tons in July to 46,208 tons in August, bringing the total consumption of natural and synthetic rubber to 85,042 long tons for the month, an increase of 8,046 tons over July.

For eight months through August 31 the industry consumed 345,377 long tons of natural rubber and 188,964 tons of reclaimed rubber. The combined total consumption of synthetic and natural rubber, 735,022 tons, represented an increase of 74,553 tons over 1946.

Survey Sumatra Plantations

For the first time since the war, a survey party was permitted to appraise the plantations of the U. S. Rubber Company in Sumatra, beginning on October 19. The company's Sumatra plantations, developed over a period of 30 years, consisted of 72,821 acres containing approximately 7,000,000 trees and yielded about 50,000,000 pounds, dry weight, of rubber a year. These properties were occupied by Japanese troops in March, 1942, and written off as a war loss in that year. The Malayan plantations of the company were repossessed early in 1946. Whether or not the company will repossess the Sumatra plantations will depend upon cost of rehabilitation, local government, and the availability of a large labor force.

To Build New Tire Plants

The Continental Machinery Co., of 261 Broadway, New York 7, New York, has received contracts to build a tire plant in South America with a planned production of 800 tires and 800 tubes a day, and another in Europe for 400 tires and 400 tubes a day, according to a statement issued by Harry J. Smith, president of the company. Both capacities are based upon an eight-hour work day. Continental will furnish the building plans and undertake to equip the plants from powerhouse to shipping room. Technical engineers will be provided by the company to install the machinery and to begin plant operation.

TECHNICAL REPORTS AVAILABLE FROM THE DEPARTMENT OF COMMERCE

Data on additional reports on industrial and technical developments which occurred throughout the world during the wartime period listed below. This information is taken from the "Bibliography of Scientific and Industrial Reports," issued by the U. S. Department of Commerce, and copies of the reports listed may be secured, at the prices indicated, from the Office of Technical Services, Department of Commerce, Washington 25, D. C. Remittances made payable to the Treasurer of the United States must accompany order. Titles of the more recent reports follow:

Testing of Rubber. Report of testing procedures from 1936 to 1941 to determine tensile strength, tear resistance, artificial aging, etc., of soft rubber.—Report No. PB 18300. 20 pp. Photostat, $1; Microfilm, 50c.

Testing of Rubber. Letter from I. G. Farbenindustrie confirming the receipt of the order of a fire-blade cutter for rubber test pieces with cutting patterns. — Report No. PB 18299. 16 pp. Photostat, $1; Microfilm, 50c.

Hanauer Gummischuh Fabrik A. G. Hanau am Main. By Glen Gay. Report on a visit to the largest German company exclusively engaged in the manufacture of all types of footwear. — Report No. PB 20463. 8 pp. Photostat, $1; Microfilm, 50c.

Isoprene Polymers. In German. Describes additional tests made upon isoprene by I. G. Farbenindustrie. Enlargement print of part of Microfilm 182-5. — Report No. PB 16327. 3 pp. Photostat, $1; Microfilm, 50c.

Synthetic and Reclaim Aircraft Tires and Service Test Results. By L. V. Coursen. Report records data collected on the service test of various synthetic tires on training airplanes from March, 1942, to June, 1943.—Report No. PB 13364. 52 pp. Photostat, $4; Microfilm, $1.

Inflation Control of Aircraft Tires. By C. D. Kelso, Jr. Discusses two methods of controlling aircraft tire inflation—deflection method and inflation pressure method.—Report No. PB 16612. 6 pp. Photostat, $1; Microfilm, 50c.

The Properties of Neoprene Synthetic Rubbers. By C. E. Jaynes and P. J. Mahoney. Report on detailed results of a series of tests on chloroprene type synthetic rubbers in order to determine their suitability for various Army Air Forces applications.—Report No. PB 10114. 14 pp. Photostat, $1; Microfilm, 50c.

Test on Hydraulic Cups. By P. J. Mahoney. Report on tests to determine volume increase of neoprene hydraulic cups.—Report No. PB 16624. 2 pp. Photostat, $1; Microfilm, 50c.

Volume Change of Butadiene Synthetics on Fuel Immersion. By P. J. Mahoney.—Report No. PB 16528. 5 pp. Photostat, $1; Microfilm, 50c.

Heat Sensitization of Buna Latices. Translation of a German document by Dr. Sinn, of the Central Rubber Laboratory, Group 2, I. G. Leverkusen.—Report No. PB 13359. 23 pp. Photostat, $2; Microfilm, 50c.

Harburger Gummiwaren-Fabrik Phoenix at Hamburg/Harburg 1. By S. J. Steadman. Examination made of the firm's respirator and protective clothing activities.—Report No. PB 7902. 10 pp. Photostat, $1; Microfilm, 50c.

Method for Improving the Chemical Resistance of Elastic Molded Parts of Natural or Synthetic Rubber. In German. Intended patent application by I. G. Farbenindustrie for coating rubber molded parts with polyisobutylene. Enlargement print of part of Microfilm 182-5.—Report No. PB 16350. 3 pp. Photostat, $1; Microfilm, 50c.

Laboratory Procedures for Distinguishing Between Natural and Synthetic Rubber Products. By P. Kluckow. Enlargement print of part of Microfilm 185-3.—Report No. PB 17613. 8 pp. Photostat, $1; Microfilm, 50c.

Apparatus for the Testing of Rubber Rings for Strength and Extensibility at Low and High Temperatures. In German. Description of test apparatus used by Louis Schopper, Leipzig. Enlargement print of part of Microfilm 185-3.—Report No. PB 19326. 3 pp. Photostat, $1; Microfilm, 50c.

Report on Reichstelle fuer Kautschuk and Fachgruppe Kautschuk Industrie. By P. D. Patterson. Report on organization and functions of Reichstelle fuer Kautschuk, a German government organization which allocates supplies of crude rubber and controls the distribution of the finished products, and the Fachgruppe Kautschuk Industrie, a trade organization which collects statistics and allocates supplies of raw material other than rubber as well as production orders.—Report No. PB 16920. 78 pp. Photostat, $6; Microfilm, $1.

Continental Gummiwerke, Hanover. By W. L. White and R. A. Schatzel. Specifications for each product produced at this plant are given and also, where known, the method of construction or processing.—Report No. PB 1045. 15 pp. Photostat, $1; Microfilm, 50c.

Japanese Heavy Rubber Protective Impermeable Suit and Mittens. Description of construction features and chemical resistance of this one-piece suit.—Report No. PB 20653. 6 pp. Photostat, $1; Microfilm, 50c.

Test Methods of the Materials Laboratory, Engineering Division, Air Technical Service Command, Wright Field, Dayton, Ohio. By A. E. Bearse and C. F. Lucks. Rubber test methods used in the above named laboratory are compiled in this report prepared at the Battelle Memorial Institute.—Report No. PB 20188. 71 pp. Photostat, $5; Microfilm, $1.

Styrene Production at Huls, Germany. Issued by the Office of Rubber Reserve.—Report No. PB 13362. 12 pp. Photostat, $1; Microfilm, 50c.

Styrene Production at Schkopau, Germany. Issued by the Office of Rubber Reserve.—Report No. PB 13361. 8 pp. Photostat, $1; Microfilm, 50c.

Styrene Production in Germany. Issued by the Office of Rubber Reserve. Report on the production and purification of ethylene, ethylbenzene, and styrene.—Report No. PB 13364. 22 pp. Photostat, $2; Microfilm, 50c.

Buna S Production at Huls, Germany. Issued by the Rubber Subcommittee of the U. S. Technical Industrial Intelligence Committee.—Report No. PB 13357. 13 pp. Photostat, $1; Microfilm, 50c.

Buna's Production at Schkopau, Germany. Issued by the Rubber Subcommittee of the U. S. Technical Industrial Intelligence Committee.—Report No. PB 13358. 19 pp. Photostat, $2; Microfilm, 50c.

Synthetic Rubber Research and Production at Leverkusen, Germany. Issued by the Rubber Subcommittee of the U. S. Technical Industrial Intelligence Committee.—Report No. PB 13356. 22 pp. Photostat, $2; Microfilm, 50c.

Summary Report, German Synthetic Insulation for Wire and Cable. Issued by the Rubber Bureau of the War Production Board.—Report No. PB 16391. 28 pp. Photostat, $2; Microfilm, 50c.

Production, Compounding, and Evaluation of German Buna S Type Rubber. By E. R. Weidlein, Jr., and R. W. Kixmiller.—Report No. PB 13340. 76 pp. Photostat, $6; Microfilm, $1.

The Heating of Passenger Automobile Tires with Relation to Speed and Tire Pressure. By H. P. Zoeppritz and W. Sander. The investigation of heating of tires by proof-stand methods was conducted on level endless belts and on revolving drums.—Report No. PB 18396. 78 pp. Photostat, $6; Microfilm, $1.

The Tensile Strength of GR-S. By J. L. Bearden. Suggested methods for obtaining accurate tensile strength of GR-S. —Report No. PB 13803. 6 pp. Photostat, $1; Microfilm, 50c.

Plastic Backing Materials for Self-Sealing Fuel Tanks. By Bernard Chasman. Investigation to determine various mechanical properties of plastic materials which have been used or considered for use as backing sheets for self-sealing fuel tanks, and to study the correlation of the mechanical properties of the plastic materials with firing tests on typical installations of the plastic panels.—Report No. PB 16773. 33 pp. Photostat, $3; Microfilm, 50c.

Performance of Non-Skid Tires, General 12-Ply Turbine Tread, 47-Inch Smooth Contour. By L. V. Coursen.—Report No. PB 9790. 3 pp. Photostat, $1; Microfilm, 50c.

New GR-S-Numbered Polymers

The Office of Rubber Reserve has announced that several experimental GR-S polymers have recently been promoted to the GR-S-numbered category. These include the following:

X-369, now GR-S-Black-20 (contains 55 parts HMF black).

X-382, now GR-S-18 (GR-S-10 stabilized with Stalite).

X-394, now GR-S-20 (similar to GR-S-20-AC, but with salt acid coagulation.

X-250, now GR-S-21 (stabilized and shortstopped with hydroquinone; contains no other antioxidant).

X-317, now GR-S-45-AC (40 to 50 Mooney GR-S stabilized with EFED).

Expanding Heel Plant

Endicott Johnson Corp., Johnson City, N. Y., is building a $75,000 addition to the rubber sole and heel plant which it recently acquired from the War Assets administration at a cost of $1,750,000. Original cost of the four buildings to the Defense Plant Corp. was in excess of $2,000,000. The addition will enlarge the main factory building by 12,000 square feet and will provide space for storage and packaging soles and heels for shipment. Approximately 650 persons will be employed in the rubber plant when manufacturing operations are transferred there around January 1.

Order Signing of Affidavits

Non-Communist affidavits were ordered signed by the executive board of the United Rubber Workers, CIO, on October 21. The announcement came from President L. S. Buckmaster, following a three-day board meeting at Boston, Mass. The action was taken by the board in order that the URWA could qualify to use the facilities of the National Labor Relations Board. URWA board action on the issue is final. The executive board was given full authority to decide the question by delegates to the 12th annual convention in early October.

Set Date For Plastics Show

The Third National Plastics Exposition will be held at Grand Central Palace in New York City, on September 27 through October 1, 1948, it was announced on November 4 by the Society of the Plastics Industry, sponsors of the exposition. The show will not be open to the public. The annual SPI banquet will be held September 29. No dates have been set for the 1948 SPI annual conference.

Tire Firms Given Extension

The time at which the eight tire firms, a number of their executives and the Rubber Manufacturers Association may make motions with respect to criminal informations filed by the Department of Justice was extended on November 5 to December 1. The informations charged violation of anti-trust laws by alleged illegal agreements to fix prices of automobile and other tires and restraint of trade.

Rot-Proof Gasket Material

A new type, rot-proof gasket material, designed to remain pliable and resilient under cold weather conditions and long service, is being installed on

the vertical and windshield edges of folding doors of school buses. The material, consisting of Fiberglas cloth coated with rubber, replaces a rubber-coated organic fabric formerly used on vertical edges and a molded rubber material used on windshield edges. The new gasket material, manufactured by the St. Clair Rubber Co., Marysville, Michigan, has been designed to meet safety standards set by the National Council of Chief State School Officers and the National Commission on Safety Education, for school buses.

Yanda Process For Tire Cord

A fibre transmutation process in which textile fibres, either natural or synthetic, are endowed with the properties of a border-line plastic, has been developed by James W. Yanda, Cleveland chemist and engineer. The process is of interest to the automobile tire field since tire cord which has been chemically treated in this manner shows an increase in tensile strength and heat resistance. The possibility of using cotton as a tire cord material also presents itself.

Victor Acquires New Building

The Victor Manufacturing and Gasket Company of Chicago, Illinois, has acquired a new building at 3636 Iron Street, in Chicago, which will add four and one-half acres of floor space to the company's facilities. The five story bulding has railroad tracks on two sides as well as six loading platforms. The new property will be used to expedite the shipment of materials produced at the Victor plant at 5750 W. Roosevelt Road, Chicago, Illinois.

New British Science Journal

A new British scientific journal is now being published, covering the wide field of general scientific research and the application of that research work in the development of industry. The publication is entitled "Research," and is published monthly by the Butterworth Co., Ltd., in England. The subscription price has been set at ten dollars per year. The journal is designed to fill the gap created by the war, since scientific journals previously published by German organizations are no longer being printed. The Butterworth Co. (Canada) Ltd., 1367 Danforth Avenue, Toronto 6, Ontario, are the sole Canadian agents.

Carbon Black Statistics

Production of carbon black in September declined 1% and shipments 3% from the August totals, according to the U. S. Bureau of Mines. September production amounted to 112,199,000 pounds, consisting of 56,159,000 pounds of channel and 56,040,000 of furnace types, as against the August total of 113,680,000. Shipments totaled 57,770,000 pounds of channel and 42,525,000 pounds of furnace types in September, for a grand total of 100,295,000 pounds, as compared with the August total of 103,744,000 pounds. Producers' stocks at the end of September amounted to 56,840,000 pounds.

Establish European Selling Unit

The B. F. Goodrich Company is planning to establish in Holland a European selling organization under the name of the Netherlands B. F. Goodrich Company. On October 29, the company officially opened a Netherlands-American tire factory, Goodrich Vredestein, described as the newest tire factory in the world, capable of manufacturing the highest quality product. The output of the factory during the first few years will be used to meet home demands but export of the products will eventually be undertaken with permission of the Netherlands Government.

Rough-Surfaced Camelback

A rough-surfaced recapping rubber that gives a special ice-gripping effect, useful for winter driving, has been announced by engineers of the B. F. Goodrich Co. The winter-variety camelback is said to differ from conventional recap stock in that it has millions of tiny abrasive particles molded right into the crown of the tire so that it has a sandpaperish feel. The abrasive stock, however, is not intended for year-round use.

Tire Prices Are Increased

Increases in the price of passenger and truck tires averaging 7½% were announced by the General Tire and Rubber Co. and the Norwalk Tire & Rubber Co. on November 10. The increases brought the general level back to what it was before the price cuts announced last spring. Other companies were expected to announce price increases shortly, with some expected to go as high as 10%.

NAMES IN THE NEWS

DAVID E. GOW, associated with Raybestos-Manhattan, Inc., for many years, has been appointed Packing Sales Manager with headquarters at Manheim, Penna.

DESIREE S. LE BEAU, director of research of the Midwest Rubber Reclaiming Co., was elected vice chairman of the Division of Colloid Chemistry of the American Chemical Society at the recent meeting in New York City. She is the first woman chemist ever elected to that position.

LYLE L. LONGWORTH, associated with sales activities of the Rubber Service Department of the Monsanto Chemical Co. for the past several years, recently moved to Winchester, Mass., to take charge of sales in the New England territory.

BARCLAY K. READ, until recently assistant sales manager of the eastern division of the Shell Chemical Corp., is now associated with the western division of the company in the same capacity.

HARRY L. FISHER, director of organic research for U. S. Industrial Chemicals, Inc., has been proposed for nomination for president-elect of the American Chemical Society. William H. Cope, of the R. T. Vanderbilt Co., and Bingham J. Humphrey, of the Connecticut Hard Rubber Co., have been proposed as councilors-at-large.

B. R. COHAN, associated with the Marathon Rubber Products Co., Wausau, Wisconsin, for many years, has been elected president and treasurer, succeeding the late J. L. Usow.

A. W. BIGGS, affiliated with the Goodyear Tire & Rubber Co. since 1928, has been named acting manager of the Supply and Flooring Department of the Chemical Products Division, succeeding OTTO C. PAHLINE, who resigned his post after 33 years' service to enter another business.

LELAND D. TIDBALL, associated with the B. F. Goodrich Co. for 25 years, has been appointed manager of Dept. 7500, Molded Goods, within the industrial products division, a new position.

CORYDON M. GRAFTON has been named chief chemist and LAWRENCE J. PATTERSON technical director of the technical staff of the Reading, Mass., mill of Goodall Fabrics, Inc., a division of Goodall-Sanford, Inc.

ALDEN C. BRETT, associated with the Hood Rubber Co., Watertown, Massachusetts, has been named director of the Controllers Institute of America at that group's 16th Annual Meeting, held October 19-22 in the Drake Hotel, Chicago, Illinois.

ARTHUR W. RISTA, associated with the U. S. Rubber Co. for 29 years, has been appointed manager of friction tape, jar ring and plumbing specialty sales for that organization, succeeding E. F. BROWNWORTH who retired after 37 years of service.

WILLIAM L. PLATT, connected with the Pittsburgh Plate Glass Company for 20 years, has been appointed Boston district sales manager of the Columbia Chemical Division of the company, with headquarters in Boston, Massachusetts.

BERT R. PRALL, executive vice-president of the Dayton Rubber Company, has resigned from that organization.

STANLEY T. CROSSLAND, formerly associated with the Office of Rubber Reserve, and vice-president of the Ethyl Corporation since June, 1946, has also been elected treasurer of that organization.

JOHN S. KRAMER, formerly associated with the U. S. Rubber Co., largely on special assignments, joined the La Crosse Rubber Mills, La Crosse, Wisconsin, as chief chemist a few months ago. He replaced Allen Varney, now chief chemist of the Servus Rubber Co.

HARRY HOWARD, formerly technical superintendent at the Rome, N. Y., plant of the General Cable Corp., is now associated with the Rome Cable Corp., also at Rome, as assistant laboratory director.

ROBERT MILLER, a member of the compounding group at the Richmond, Ind., factory of the Belden Manufacturing Co., has been named chief compounder replacing MARK BALLARD who resigned to enter the paper business.

H. M. HUDAK, former assistant to the president of the Kelly-Springfield Tire Co., a subsidiary of the Goodyear Tire and Rubber Co., has been named superintendent of production of the service division for Goodyear at Akron.

ADMIRAL WRAY AUBREY FITCH, USN., retired, has accepted a vice-presidency with the General Tire & Rubber Export Co., of Akron, Ohio.

PAUL O. POWERS, technical adviser of the Battelle Memorial Institute, Columbus, Ohio, has been elected chairman of the Division of Paint, Varnish and Plastics Chemistry of the American Chemical Society.

CLARENCE H. LEVEE, former Naval Lieutenant Commander, has been appointed as manager of electric utility sales of the wire and cable department of the U. S. Rubber Co.

Conover Joins Manhattan Rubber

Fred S. Conover

Fred S. Conover, associated with the Naugatuck Chemical Division of the U. S. Rubber Co. since 1935, has left that organization and has rejoined the Manhattan Rubber Division of Raybestos-Manhattan, Inc., at Passaic, N. J. He was affiliated with Manhattan Rubber from 1930 to 1934, and worked with Rubatex Products, Inc., at Bedford, Va., for about a year before going to Naugatuck Chemical. Born on January 2, 1900, in Trenton, N. J., Mr. Conover received his B.S. from Colgate University in 1922. In that year he joined the former Dexter Rubber Co. and the following year went to work for Republic Rubber. In 1925 he became affiliated with the N. J. Zinc Co., remaining with that concern until he joined Manhattan Rubber. A member of numerous technical organizations, Mr. Conover is a past chairman of the New York Rubber Group. In his new position with Manhattan Rubber he will be associated with technical development and compounding activities.

Introduce New Hycar Rubbers

Two new Hycar oil-resistant synthetic rubbers have been introduced by the B. F. Goodrich Chemical Company, Cleveland, Ohio, and are in commercial quantity production. Designated as Hycar OR-25 EP (Easy Processing) and Hycar OR-25 NS (Non-Staining), these new rubbers are said to have superior processing characteristics over the regular Hycar OR-25. Hycar NS differs from Hycar EP only in that a different anti-oxidant has been added to the former, making it non-staining and non-discoloring.

CLARK A. FAILING, assistant secretary of Goodyear Foreign Operations, Inc., since 1940, has been appointed as assistant managing director of the Goodyear Tire & Rubber Co. of New Zealand.

WILLARD P. SEIBERLING, secretary of the Seiberling Rubber Co., Akron, Ohio, has been elected a member of the Board of Education of Akron.

DETROIT GROUP HEARS SEMON SPEAK ON EUROPEAN RESEARCH

The fall meeting of the Detroit Rubber and Plastics Group, Inc., was held on October 24th in the Detroit-Leland Hotel with approximately 125 members and guests in attendance. The speaker of the evening was Dr. W. L. Semon, director of pioneering research of the B. F. Goodrich Company, Akron, Ohio. Dr. Semon is particularly noted for his discovery of Koroseal in 1926, and the development of Ameripol-Hycar in 1939. The Group heard Dr. Semon, who recently returned from a two-month trip through Europe, speak on "The Relation of European Research and Economics to American Industry."

Dr. Semon said that at the Frythe, north of London, English scientists are doing a great deal of basic theoretical work on the properties of polymeric material—fibres, resins and rubbers. Investigations are being made of molecular structure by passing ultrasonic waves along stretched fibers. Research is underway on antibiotics, some of which have specific properties superior to penicillin. At the Blackley laboratory, near Manchester, work was being concentrated on the manufacture and the properties of high polymers. Emulsion polymers and mass polymers of the neoprene type were being extensively investigated. They were working also on synthetic rubbers, Nylon and Terylene.

The Dutch have been quite successful in surfacing a highway with rubber which has lasted for ten years, said Dr. Semon. This rubber road consists of surfacing a concrete highway with a mixture of rubber powder stirred into cutback asphalt. The rubber surface is flexible, tough and waterproof, hence it prevents moisture penetration to the road bed.

In conclusion, Dr. Semon stated that Europe needs the help of American industry and agriculture. On the other hand, American industry has much to gain by utilization of the research and skills of European nations.

Northern California Party

The Northern California Rubber Group will hold its Fifth Annual Christmas Party on December 8, at the "Willows," Orinda, California. Committee members for the affair include: Ed Coxhead, Elmer Lycett, Walt Boswell, Russ Kettering, Ross Morris, Bob Henderson and Fred Swain. Reservations are being accepted by Ed Coxhead, 353 Sacramento Street, San Francisco 11, California, at $5.00 per plate.

Chicago Plans Christmas Party

The annual Christmas Party of the Chicago Rubber Group will be held on December 19, in the Morrison Hotel, Chicago, Illinois. The feature of the evening will be "Ladies' Night," and the program will include dinner, entertainment and dancing. There will be special gifts for the ladies. A cocktail hour at 6:00 p.m. will inaugurate the activities.

Baker Joins General Tire

Larry M. Baker

Larry M. Baker, active in the rubber manufacturing field for the last 14 years, has joined the General Tire & Rubber Co., Akron, as manager of interplant technical service. Mr. Baker was manager of the technical division of the Mansfield Tire & Rubber Co. prior to his new appointment. His previous industry experience includes tire compounding management as well as chemical development work. Mr. Baker is a member of the Rubber Division of the American Chemical Society. While at Akron University, he was active in the Phi Delta Theta fraternity.

Materials Handling Conference

Topics of interest to the rubber and tire industries will be discussed at the conference on materials handling which will be a feature of the second annual exposition to be held at the Public Auditorium, Cleveland, Ohio, January 12-16. The major theme of the discussion will be cost reduction through improved materials handling. Keenest interest in the rubber and tire industries will center on these discussions: "Arranging stock for effective handling"; "Handling factors in plant layout"; "Handling unusual shapes"; "Reckoning with floor loads and elevator capacities," and "When manual operations pay." Films and demonstrations will be part of the exposition. Information about the conference program and the exposition may be obtained from Clapp and Poliak, 350 Fifth Avenue, New York 1, N. Y.

Quebec Holds Informal Meeting

The Quebec Rubber and Plastics Group held its first meeting of the 1947-1948 season at the Hotel Ritz-Carlton in Montreal, Canada, on October 16. Chairman A. S. McLean saluted old members among the approximately 60 present, and welcomed new members and guests. The program for the season was outlined, and several films were shown. Annual dues were again announced at $2.50. The evening closed with the serving of refreshments.

SPEAKER CITES ROLE OF NYLON TO BUFFALO GROUP

The Fall Meeting of the Buffalo Rubber Group was held at the Hotel Sheraton in Buffalo, N. Y., on October 14. Principal speaker of the evening was Nicholas R. du Pont, Manager of Industrial Sales of the Nylon Division of E. I. du Pont de Nemours & Co., who spoke on the industrial uses of Nylon, with a review of Buffalo's part in the fibre and related film developments.

Mr. du Pont paid tribute to the rubber industry for the assistance, cooperation and suggestions offered in the development of synthetic yarns. As a result of this cooperative endeavor, the first commercial production of a high tenacity rayon yarn for tires was achieved in 1933. He told the well-attended meeting, that as time goes by, more and more textile engineers and planners will call upon Nylon to impart its properties to new and better textiles. This is, of course, apparent to those in the rubber industry, said the speaker, since Nylon has taken its place as the primary yarn for aircraft tire cord.

In the automotive field, premium tires with Nylon cords or Nylon shock shields are now appearing, said Mr. Du Pont. It is anticipated that the rubber industry will find that Nylon will fit in as a reinforcement for many rubber products, places where one or more of Nylon's outstanding properties will be of service, concluded the speaker.

Issue Monthly Black Report

Statistics of the carbon black industry in the United States are to be published monthly by the Bureau of Mines of the Department of the Interior, beginning a projected series of more timely data than have been publicly available in the past. Production and shipments of carbon black, particularly of the channel types, continued at high levels during August, reported the Bureau. Carbon black production of channel types in August totaled 56,731,000 pounds, and furnace types 56,949,000 pounds. Shipments of channel types in August were set at 57,251,000 pounds and furnace types at 46,943,000 pounds. Producers' stocks at the end of August totaled 9,992,000 pounds of channel types and 34,944,000 pounds of furnace types, a total of 44,936,000 pounds.

Quebec Group Elects Officers

The Quebec Rubber and Plastics Group elected the following officers for the 1947-1948 season: *Honorary Chairman,* E. A. Thorne (Diamond State Fibre Co. of Canada, Ltd.); *Chairman,* A. S. McLean (British Rubber); *Secretary-Treasurer,* Paul Morvan (British Rubber). Committee chairmen elected include: *Special Events,* W. R. Blundell (Dominion Rubber); *Membership,* A. W. Bell (St. Lawrence Chemical Co.); *Publicity,* F. D. Cobbett (Canadian General Electric); *Program,* Andre Gagnon (Acton Rubber); *Reception,* H. Loiselle (Northern Electric Co.).

FINANCIAL NEWS

Boston Woven Hose & Rubber Co.

Year Ended Aug. 31: Net income of $1,312,848, equal to $14.74 a common share, which compares with $498,671, or $5.28 a share, reported for the previous fiscal year. Sales for the year, largest in the company's history, amounted to $17,053,284, an increase of $5,809,898, or 51.7%, over the $11,243,386 in the previous year. The consolidated balance sheet as of August 31, 1947, revealed total current assets of $7,107,268, including $3,594,281 in cash and government securities, $1,290,743 in notes and accounts receivable, and $2,222,244 in inventories. Total current liabilities amounted to $1,729,362, including $551,152 in accounts payable, $1,018,612 in accrued taxes, and $159,598 in advances on contracts.

General Sales To Set Record

Sales of the General Tire & Rubber Co., Akron, will reach a new high near $130,000,000 this year, according to a statement made by Howard A. Bellows, eastern division sales manager, at a tire sales meeting at the Essex House, New York City, on November 5. This year's sales compare with last year's record of $105,000,000. While passenger tire sales for the entire rubber industry are currently 18% ahead of last year, most of the amount is used up by demand of new car production. Replacements for the industry as a whole are only about 0.6% ahead of last year. General's sale of replacement tires has been about 19% ahead of last year. The company does not sell new tires for original automobile equipment.

Record Sales For Lee Rubber

Unit sales of the Lee Rubber & Tire Corp., Conshohocken, Pa., for the fiscal year ended October 31, are expected to be shown at new record levels, and dollar sales are also likely to be shown in excess of the $32,150,000 for the fiscal year ended October 31, 1946, previous record high. Profits will amount to approximately $9.00 a common share, or not far from the $8.91 reported for the 1946 fiscal period. Helping profit margins has been the increasing importance of the mechanical rubber goods division in total sales.

New Jersey Zinc Company

Nine Months: Net profit of $6,213,848, which is equal to $3.17 a share, and which compares with $3,434,010, or $1.75 a share, last year. Net profit for the September quarter was $1,732,535, or 88 cents a share, against $1,102,042, or 56 cents a share, for the corresponding period last year.

Seiberling Rubber Company

Nine Months: Net profit of $222,199, a sharp drop from the $987,312 reported for the corresponding period of the previous year. The 1947 period, however, included a strike that crippled the company's production for seven weeks during April and May. Net earnings for the third quarter of 1947 amounted to $170,020, as against $371,809 for the 1946 period. Net sales for the quarter were $7,685,286, as against $8,369,996 in the third quarter of last year.

Rome Cable Corporation

Six Months Ended Sept. 30: Net profit of $554,263, or $1.35 a common share, against $470,914, or $1.19, last year. For the September quarter, net profit was $186,489, or 44 cents a share, which compares with $237,426, or 58 cents a share, for the September quarter of 1946. Net profit of $1,439,464, or $3.59 a common share, was reported for the twelve months ended September 30.

General Cable Corporation

Nine Months: Net income of $4,627,400, increased from $1,333,719 earned in the 1946 period, when work stoppages occurred at five of the company's plants during the early part of the year.

Pioneer Rubber Company

Year Ended Sept. 1: Gross profit of $743,006 and net profit of $464,506 after taxes had been deducted. Sales and earnings were the highest in the company's history.

Hewitt-Robins, Inc.

Nine Months: Net earnings, after all charges, of $927,027, which is equal to $3.33 a share, and which compares with a net profit of $72,909 for the corresponding period of 1946.

National Automotive Fibres, Inc.

Nine Months: Net profit of $1,451,914, which is equal to $1.52 a share and compares with $851,559, or 89 cents a share, last year.

Belden Manufacturing Company

Nine Months: Net profit of $989,105, which is equal to $3.39 a share, and which compares with $523,363, or $1.79, for the corresponding period last year.

Manufacturing Toy Balloons

Smith Rubber Craft is the name of a new corporation located at 114 Railroad Street in Hattiesburg, Miss., which is already engaged in the manufacture of toy balloons. The new company, which is licensed by American Anode, Inc., anticipates the production of additional latex items in the near future. Employment is expected to reach between 30 and 50 workers. Officers of the new concern include Burnice W. Smith, president and manager; Dr. Prentiss E. Smith, secretary, and Dr. Hobart A. Smith, treasurer.

Approve $52,000,000 Wire Plant

The United States Steel Co. has appropriated $52,000,000 to its subsidiary, the American Steel & Wire Co., for a new high-strength steel wire plant. The plant will be built near Cleveland and will occupy 135 acres of land. Steel wire to be made in the new plant will be used partly to replace cotton, rayon or nylon as a fabric in building tires for trucks, buses and off-the-road equipment. American Steel is already turning out such wire at one of its plants in Illinois.

Radio Coil Cement

A cement for radios has been developed by the Java Latex and Chemical Corp., 47 West 34 Street, New York City. Known as No. 26 Coil Cement, it was formulated to meet the needs of the radio industry for an adhesive to bind together and preserve radio coils and to adhere antenna coil to the inside of radio cabinets. The new coil is said to have excellent insulating qualities because of its high electrical resistance thus curtailing the possibility of short circuits within a radio set.

Indonex R-10 Light Process Oil

The Chemical Products Department of the Standard Oil Co. of Indiana, Chicago 30, Illinois, has placed "Indonex" R-10, a completely synthetic light process oil, upon the market. Use of the product is indicated in the compounding of natural and synthetic rubber products where an oil of light color and low viscosity is required. A technical bulletin indicating the advantages of the new material in various compounds is available on request from the company.

A new type of plastic garden hose, said to be considerable lighter than the conventional rubber type, is now being marketed by the Industrial Synthetics Corp., Garwood, N. J. If water is frozen, the hose will not burst, according to the manufacturer.

The W. J. Voit Rubber Corporation of Los Angeles, Calif., has opened a new office and warehouse in New York City at 251 Fourth Avenue. It is under the supervision of Vic Adams.

Hewitt Rubber has announced production of an additional type of smooth bore water suction hose. It is of the chernack-loom type construction and due to its special type of construction it can be easily reformed to shape if crushed or kinked.

Division Committees Announced

Harry E. Outcault, of the St. Joseph Lead Co., New York City, Chairman of the Division of Rubber Chemistry of the American Chemical Society, has announced the following Division appointments:

Finance Committee: E. B. Babcock, chairman (Firestone), E. B. Bridgwater (DuPont), and C. P. Hall (C. P. Hall Co.).

Library Committee: B. S. Garvey, Jr., chairman (Sharples Chemicals), Ralph Appleby (DuPont), Frank Kovacs (Seiberling), H. E. Simmons (University of Akron), H. N. Stevens (Goodrich), H. C. Tingley (U. S. Rubber), Phyllis Hamilton (Firestone), Dorothy Hamlin (University of Akron), Leora Straka (Goodyear).

Divisional Councilors—American Chemical Society: Seward G. Byam (DuPont), and John T. Blake (Simplex Wire).

Membership Committee: James C. Richards, chairman (Goodrich). Committee members to be announced at a later date.

Arrangements Committee for Chicago Meeting: Robert C. Dale (Inland Rubber), chairman. Other committee members will be announced at a later date.

Editors for Proposed Book on Elastomers: C. C. Davis (Boston Woven Hose), R. F. Dunbrook (Firestone), G. S. Whitby (University of Akron).

Rubber Chemistry & Technology: Editor—C. C. Davis (Boston Woven Hose), Advertising Manager— S. G. Byam (DuPont).

Receives Czech Medal

Herbert S. Karch, technical sales representative of the C. P. Hall Co., Akron, Ohio, has been awarded the Military Medal of Merit, First Class, by the President of the Republic of Czechoslovakia. The medal was awarded for his assistance to the Czechoslovakian mission at Paris in disposing of surplus Army equipment and supplies. At that time, Mr. Karch was on duty as a Major in the U. S. Army, serving with the State Department in the Office of the Foreign Liquidation Commissioner for Europe. Mr. Karch also holds the Victory Medal, World War I, with two battle stars, having served with the 37th Infantry Division, and the Army Commendation Ribbon. He presently is in command of the 13th Ohio Ordnance Battalion in the Organized Reserves with the rank of Major.

Expands "Restfoam" Production

A $600,000 expansion program, including two new plant facilities, for the two-year old "Restfoam" Division of Hewitt-Robins, Inc., was announced on October 27. This expansion represents the latest step in the company's post-war program. To date, $3,000,000 has been spent for plants, engineering, equipment, research, development and sales promotion activities in launching the "Restfoam" Division. Seven hundred thousand dollars was recently spent for new plant facilities and equipment in expanding the company's molded hose department.

Moser Named Technical Director

William M. Moser

William M. Moser, formerly associated with the Enjay Co., with headquarters in Akron, was named technical director of the Pharis Tire & Rubber Co., Newark, Ohio, on November 1. During the war years, Mr. Moser was chief chemist of the Armstrong Tire & Rubber Co., Natchez, Miss. He has specialized in the synthetic field, working intensively on the development of Butyl products. Mr. Moser was born and raised in Switzerland, and received his Chemical Engineering degree at the University of Berne. He did post-graduate work in Zurich and Geneva. Mr. Moser came to the United States in 1921.

Plan To Push Tire Sales

A plan under which car dealers can install complete tire sales departments through investment in a changeover sales program, was presented to approximately 300 car dealers by Howard Bellows, eastern divisional sales manager of the General Tire & Rubber Co., Akron, Ohio, during a sales conference at the Essex House, in New York City, on November 5. It was recommended that automobile agencies: (1) set up completely self-contained tire departments, (2) hire and train a specialized department manager to concentrate exclusively on the sale of tires, and (3) equip the department with complete facilities for tire sales, including a projection room for showing sales movies available from General.

Produces 425,000,000th Tire

The Goodyear Tire & Rubber Co. announced on November 11 the production of the 425,000,000th tire for motor vehicles since the company started making tires in 1902. The company also stated that it has produced its 25,000,000th tire since December 31, 1946, which establishes a new all-time production record. To produce the first 25,000,000 tires required 210 months, that milestone having been attained on June 30, 1919. The company's previous production record was in a twelve-month period in 1928-1929 when its output amounted to 25,000,000 tires.

Industry to Aid Army Reserve

The War Department has called upon industry to play a major part in the present plans for creation of a large pool of reserve service units, ready for immediate mobilization should this nation again suddenly find itself at war. Under a plan known as the War Department Affiliation Program, civilian organizations will "sponsor" certain key service type units of the Organized Reserve Corps. The purpose of these industrial reserves is to provide effective operating units of an administrative or technical nature for immediate mobilization. One such unit will be sponsored by the United Engineering and Foundry Co. at its New Castle, Penna. plant.

Ludox Colloidal Silica

"Ludox" colloidal silica, a fluid, opalescent aqueous dispersion containing the elements of common sand in a relatively high state of purity and in a finely divided form, was announced recently by E. I. du Pont de Nemours and Company. "Ludox" affords a means of modifying many other materials to utilize the inherent properties of silica, namely, mechanical strength, resistance to atmospheric and chemical agents, and resistance to heat. These qualities accordingly suggest that it may find wide application in the compounding of rubber, for the surface treatment of paper, in leather dressings, and for numerous other industrial uses.

Lease Spencer Rubber Plant

Authority has been granted Special Receiver T. V. Foster, to lease, with an option to buy, the Spencer Rubber Company plant at Spencer, West Virginia, to Synthetics Products, Inc., of Detroit, Michigan. The plant was one of three established by Dr. Glenn A. Casto, a Spencer dentist. Two others at Parkersburg, West Virginia, and Marietta, Ohio, are still in the hands of receivers. William S. Cooper, representing the new owners of the plant, said that it would continue processing of products for the Monarch Rubber Company at Baltimore, Md., as well as the production of floor tiling. The Spencer plant employs an average of 50 men.

Dismiss Ship Seizure Suit

Federal Judge Alfred C. Coxe, in New York City, dismissed on November 5 a suit brought by the Isbrandtsen Steamship Co., Inc., for $3,084,241 damages allegedly sustained by the company in the seizure of its ship, the *Martin Behrman,* by the Royal Dutch Navy, last March. At the time of the seizure the ship was carrying a cargo of Netherlands East Indies rubber. The order was based upon the fact that the defendants, the Netherlands East Indies Government, Hubert J. van Mook, Lieutenant Governor-General of the Netherlands East Indies, and the Netherlands Government, enjoy immunity as sovereigns from suits in United States courts.

OBITUARIES

Ernest Blaker

Dr. Ernest Blaker, widely known for his work in rubber research, died suddenly on October 20 at his home in Akron, Ohio. He was 77 years old.

Dr. Blaker had been associated with the B. F. Goodrich Co., for more than 20 years. He had come to the concern in 1919 from Cornell University, where he had served on the faculty. He received his degree in civil engineering at the University of Kansas in 1893, and his doctor's degree in physics at Cornell.

Dr. Blaker's research dealt largely with heat and temperature control, and he was the author of several technical papers. He officially retired from Goodrich in 1939, but returned during the war emergency.

Dr. Blaker was active in many professional groups. He was a member of the American Chemical Society, American Physical Society, American Association for the Advancement of Science and the Society of Automotive Engineers. Dr. Blaker was a member of the Tadmor Shrine and belonged to the Akron council of the Masons. He was a member of Sigma XI and Beta Theta Pi fraternities.

Services were held on October 22 at the Billow Chapel in Akron. He is survived by his wife, Adelaide.

Francis E. Lloyd

Professor Francis Ernest Lloyd, internationally known botanist, and one of the first experimenters with the guayule rubber plant, died on October 17 in Carmel, California. He was 79 years old.

Born in Manchester, England, Dr. Lloyd attended Lafayette College and was graduated from Princeton University in 1891. He headed the department of botony at McGill University in Montreal from 1912 until his retirement in 1934.

Dr. Lloyd at one time explored Sumatra for the Continental Mexican Rubber Company who were then experimenting in the growth of Hevea trees. He also explored Dominica, B.W.I., for the New York Botanical Gardens, and remote sections of Arizona for the Carnegie Institute. He leaves a wife, Mary Elizabeth.

Samuel Crowther

Samuel Crowther, co-author with Harvey Firestone of the book, "Men and Rubber," which described the Firestone plantations in Liberia, died on October 27 at the New England Baptist Hospital in Boston, Massachusetts, after a long illness. Mr. Crowther was 67 years old. Surviving are his wife, a son and daughter.

Arch E. Rearick

Arch E. Rearick, associated with the Goodyear Tire & Rubber Company for 38 years, died on October 22 in Gadsen, Alabama, as the result of a heart attack. Mr. Rearick was 53 years old. Born in Strasburg, Ohio, Mr. Rearick joined Goodyear in 1909. He became general foreman of stock preparation at Goodyear plant No. 2 in Akron, and in 1930 was sent to the company's factory in Sydney, Australia, as a division superintendent. He returned to this country in 1936 to become division superintenat the Gadsen, Alabama, plant, a position he held until his death. Mr. Rearick was a member of the Masons and the Shriners. He leaves his wife, Maude.

Henry N. Young

Henry N. Young, former vice-president of the Hamilton Rubber Mfg. Co., of Trenton, N. J., died of a heart ailment on November 5, in Princeton, N. J. He was 62 years old. Born in Wilkes-Barre, Pa., Mr. Young was a member of the class of 1907 at Amherst College and later did graduate work at the University of Pennsylvania. He spent two years in China with the British-America Tobacco Co., and then became affiliated with Hamilton Rubber. At the time of his death he was vice-president and advertising manager of the "New Jersey Compass," a magazine devoted to the interests of the state. A widow survives.

Henry McKiernan

Henry McKiernan, production superintendent of the Sun Rubber Co., died at his home in Barberton, Ohio, on October 5. Mr. McKiernan was 59 years old and had been associated with Sun Rubber for 17 years. He was born in Wadsworth, Ohio, on March 8, 1888, and had lived in Barberton for 50 years. He was a member of the Fraternal Order of Eagles. Funeral services were held on October 8, at the Campfield-Hickman Chapel. Burial was in Greenlawn Memorial Park. A widow, two daughters and a son survive.

Peter J. King, Jr.

Peter J. King, Jr., chief of standards at the Dayton Rubber Co., Dayton, Ohio, died on October 13 in Dayton. He was 53 years old. Mr. King joined Dayton Rubber four years ago. Previously he had been employed with the Goodyear Tire & Rubber Co. at Akron. Services were held at St. Vincent's Church in Akron on October 18, with interment in Holy Cross cemetery. He is survived by his wife, Mary.

Edmund W. Winegar

Edmund Wills Winegar, director of engineering of the Ohio Rubber Co., Willoughby, Ohio, died on October 18, as a result of injuries sustained in an automobile accident. He was 48 years old. Born in Middlebury, Indiana, Mr. Winegar came to Willoughby in 1924 to work for the Buckeye Rubber Co. which became Ohio Rubber in 1926. He began his career as a master mechanic and rose to the position of director of engineering. Mr. Winegar was a member of the Fraternal Order of Eagles and a 32nd degree Mason. He was also a member of the Society of Automotive Engineers, the National Association of Foremen, Army Ordnance Association, Cleveland Engineering Society and the American Chemical Society. He was a member of the Old Timers Club at Ohio Rubber, and had served as a member of the Willoughby Council since 1937 as Chairman of the Safety Committee and as a member of both the Welfare and Finance Committees. Burial services were held on October 22 at the Methodist Church in Willoughby. He leaves a wife, Lois Evelyn.

Daniel H. Owen

Daniel H. Owen, former owner of the D. H. Owen Rubber Co., of Canton, Ohio, died on November 5, at Lake Worth, Fla. He was 68 years old. Mr. Owen was born in Burton, Ohio, and was in business for 18 years in Akron before leaving for Florida in 1943. Services and burial were held on October 7 in Lake Worth. A widow survives.

Offer Another Black Plant

The War Assets Administration has announced that a surplus carbon black plant at Monument, Lea County, New Mexico, is being offered for sale or lease. The plant occupies approximately 340 acres and has a designed capacity of approximately 15,200,000 pounds of channel type carbon black per year. Charles Eneu Johnson & Company are operating the plant under an interim lease cancelable on 30 days' notice. The WAA, Office of Real Property Disposal, 728 Fifteenth Street, Denver, Colorado, is inviting bids for the purchase or lease of the property.

Pliofilm More Freely Available

Pliofilm, the transparent and moisture-proof film product of the Goodyear Tire & Rubber Co., which since the war has been used exclusively for packaging of perishable foods and other like commodities, is once more available to fabricators for use in shower curtains, rainwear, garment bags, ladies' accessories, and similar items. According to A. F. Landefeld, manager of the Pliofilm Department of Goodyear's Chemical Products Division, the present material is stronger and softer than that available to the fabrication field in the prewar period.

LOS ANGELES NEWS

The October meeting of the Los Angeles Rubber Group, held on October 7 at the Hotel Mayfair in Los Angeles, was again representative of the social and educational values of these meetings to the rubber industry of Southern California.

The Technical Group met as usual prior to the evening meeting and dinner. W. J. Thomas, of the Firestone Tire & Rubber Co., introduced Rolla H. Taylor, technologist in the Rubber Section at the National Bureau of Standards. Mr. Taylor discussed the general organization and functions of the NBS, stressing particularly the work being done with the Mooney Viscometer and the Shore Durometer in the physical testing of rubber.

"As the most important property of a rubber is usually its ability to stretch and retract," Mr. Taylor said, "the tests most commonly made on rubber are tests of its tensile properties." He went on to relate the years of research at the Bureau which has resulted in a great many of the methods and principles now used in American industrial laboratories for the physical testing of rubber, such as the use of flat dumbbell specimens instead of the ring specimens used in Europe.

With the advent of synthetic rubber, additional work became necessary in this field. Redeterminations of temperature coefficients, standard deviations of testing and other quantities were required by the new materials. Also, closer control of certain variables in physical testing was found to be necessary in controlling the production of a uniform synthetic rubber.

Prior to 1942 the rubber industry could agree on no single test for determining the plastic properties of unvulcanized natural rubber. In order to control the production of synthetic rubber, it was essential to have a reliable method for measuring this property. The Office of Rubber Reserve, and its agents, decided to employ the Mooney Viscometer for this purpose.

As manufactured at the time, the viscometer did not permit the reproducibility required to control the production of a uniform synthetic rubber. The NBS was given the task of development, and as a result of their investigations a viscometer of improved design was developed and is being manufactured now. Today it has become the most common means of measuring plastic properties in the rubber industry.

Mr. Taylor also acquainted the Los Angeles Rubber Group with the history and other phases of work performed by the National Bureau of Standards. Work on rubber was first started in about 1905 concerning the fundamental properties and constants, and the development of tests. The nature of their work kept pace with the expansion of the rubber industry, resulting in a good number of methods and testing devices now in use which were first developed at the Bureau.

Among the more outstanding are the endurance wheel and abrasion test machine for tire testing; the use of refractive index as a method of determining the styrene content of a GR-S copolymer and the determination of freezing points as a method of measuring the purity of styrene, butadiene, and other monomers; and a valuable program of coordination in the fields of polymerization, determination of molecular weights, and similar phases.

Mr. Taylor emphasized the work done by the Bureau in practically every phase of rubber research and technology. "Most important," he stressed, "is that all members of the rubber industry avail themselves of the help offered by the Bureau." Not only does the Bureau serve other government agencies, they supply information on request to the public in the fields of physics, chemistry and engineering. Individuals and small business firms are constantly receiving assistance.

The adjournment of the technical meeting was followed by a dinner and program featuring Mr. J. C. Ballagh (Patterson-Ballagh), who recently returned from a 19,000 mile trip through Europe and Africa. Mr. Ballagh's main topic was "England's Economic Plight," and the measures we must take to help the democratic governments throughout Europe.

The Southern California Rubber Industry were hosts to the members of the American Trucking Association, meeting at their annual convention in the Biltmore Hotel, Los Angeles. The Goodyear Tire & Rubber Co. had its president, E. J. Thomas, act as host to the delegates at a luncheon, while the Firestone Tire & Rubber Co. invited the Association to a reception in the Biltmore Bowl.

D. W. Walsh (U. S. Rubber) unveiled a new tire construction method during the A.T.A. convention. Called the "Steelmaster," the tire is made with steel cord fabric instead of the previous cotton or rayon thread cords. The steel cords are similar to piano wire and after six years of development, research and road testing, the company claims many advantages. Mr. Walsh announced that the new tire would be sold for heavy duty purposes at present.

H. D. Foster (Goodyear) announced the appointment of Richard G. Abbott as Los Angeles District Manager of the firm's mechanical goods division. The area also includes Nevada, Arizona, New Mexico and El Paso, Texas.

Engineers and fishermen in the San Francisco area recently witnessed a revolutionary process in the speedy unloading of fish from part of San Francisco's fishing fleet. Demonstrated by W. C. Burns (U. S. Rubber), the system was revealed as a new type vacuum hose connected to a large suction pump located on the docks. Mr. Burns told witnesses that in an experimental test, the device sucked up fish a distance of 1,500 feet, from boat to dock, eliminating the usual laborious efforts.

The Los Angeles Rubber Group recently extended their best wishes to Mr. A. J. Hawkins (DuPont), who married the former Miss Lorraine McNeal in Santa Barbara, Calif.

The new $750,000 plant of the Minnesota Mining & Manufacturing Co. in the Los Angeles area recently started operations. The plant is manufacturing adhesives, coatings and sealers for use in automotive and aircraft manufacturing, as well as general industry, and will also produce "Underseal," the company's rubberized protective coating which is sprayed on the underbodies of autos, trucks and buses to reduce noise and prevent abrasion and corrosion. The new facilities will also serve as the west coast warehousing center for distribution of the company's other products.

The Annual Christmas Party of the Los Angeles Rubber Group will be held on Tuesday, December 2, in the Rainbow Room of the Hotel Mayfair in Los Angeles. A gala evening is promised, with entertainment de luxe and prizes galore. This is the one meeting of the year at which members have the opportunity of entertaining their ladies at a party sponsored by the Group. Reservations should be made as early as possible.

Stauffer Lowers Sulfur Price

A reduction of 5 cents per pound in the price of insoluble sulfur was announced by the Stauffer Chemical Co. on November 11. The reduction, which became effective as of November 1, is due to a new process of manufacture developed by the company's research department, officials stated. The main use for insoluble sulfur, known under the Stauffer trade name of "Crystex" has been by the rubber industry in tire carcass stocks. It is also used in repair stocks such as camelback for retreads and in some types of mechanical rubber goods. Further price reductions for the chemical are considered feasible by the company over the long term period when increased sales and further production economies are effective.

Domestic Rubber Exports Decline

Value of United States domestic exports of rubber products and materials declined in September for the fourth successive month. The figure of $14,250,239 is the lowest monthly total of the year, the Office of Domestic Commerce, Department of Commerce, said on November 5. However, the September total dwarfed the 1935-1939 monthly average of $2,403,436. A continued decline in total value of rubber goods exports is expected during the final quarter of 1947, ODC said. In 1948, exports of rubber products probably will be well below the 1947 level.

CANADIAN NEWS

Canada's only synthetic rubber plant, the crown-owned Polymer Corporation at Sarnia, will manufacture chemical raw materials for industries dependent on it "regardless of its future in manufacturing rubber," Reconstruction Minister Howe announced recently.

The disclosure came in a message read by Deputy Minister V. W. Scully to officials and workers celebrating the fifth birthday of the $40,000,000 company, which organized in 1942 to produce man-made rubber for war purposes.

Mr. Howe's message was believed a reply to rumors that falling prices of rubber might cause a sharp curtailment of Polymer production and result directly in a breakdown of the huge set-up of integrated chemical factories in this area.

"Polymer has become a source of raw materials for a great and growing organic chemical industry in the Sarnia area," said Mr. Howe. "Polymer will continue to manufacture raw materials for those industries regardless of its future in manufacturing synthetic rubber. However, provided costs of production can be held at present levels, I believe that Polymer will have a permanent place in the rubber market."

Simultaneously, Polymer released figures on its production to date, its two main types of rubber being GR-S and Butyl.

It produced 56,056,679 pounds of GR-S in 1944, 82,227,592 in 1945, 80,279,070 in 1946 and 88,776,891 in 1947 thus far. Butyl production totalled 1,232,980 pounds in 1944, 18,947,005 in 1945, 25,148,382 in 1946, and 19,040,205 in 1947 to date.

Incidentally, E. J. Brunning, president of the Polymer Corp., recently revealed that the board of directors has authorized the expenditure of "several millions" for additional facilities.

Possibility of a new wage drive by 10,000 members of the United Rubber Workers of America (CIO) was seen recently with a meeting of the Union's policy committee, called to deal with the rising cost of living and the slacking off in employment in the industry.

Representatives from rubber plants in Hamilton, Kitchener, Oakville, Toronto, Bowmanville and New Toronto, met in Toronto, to discuss the advisability of seeking new wage increases and of inaugurating a 40-hour week to avoid possible lay-offs in the future.

Some locals reported that cuts in production and lay-offs and reductions in the work week have already taken place—on a limited scale.

The policy committee authorized its research department to make a study of the situation so that an immediate policy for action can be offered.

A number of locals are now negotiating for new contracts or are planning for open negotiations in a few weeks. Most of the other locals can reopen the wage question under clauses that provide for reconsideration of wages "when economic conditions warrant."

Consumption of natural rubber by Canadian manufacturers in July amounted to 2,433 long tons, compared with 2,627 tons in the preceding month, synthetic 2,059 tons compared with 2,540, and reclaim, 1,120 compared with 1,299, according to figures released by the Dominion Bureau of Statistics.

Domestic production of synthetic rubber totalled 3,480 long tons in July compared with 3,392 in June and reclaim 225 long tons compared with 334.

Stocks of natural rubber at the end of July decreased to 10,045 long tons from 10,108 in June, and synthetic to 3,733 long tons from the previous month's figure of 4,488. Stocks of reclaim rubber increased in July to 2,629 tons from 2,599 tons in June.

The manufacture of high grade zinc oxide for the rubber, paint and other trades has been started in Canada by Durham Chemicals (Canada) Limited at Cap de la Madeleine, Quebec. Headquarters of the company are maintained at 297 St. Paul St. West in Montreal. Three grades will be sold to the rubber manufacturing field called, respectively, Standard Rubber, Loled and Noled. The firm of Harrison & Crosfield (Canada) Limited is acting as sales representatives for the new zinc oxide.

Furniture manufacturers, hotel owners, and hospital authorities are discovering Airfoam, the new cushioning material soon to be produced by the Goodyear Tire & Rubber Co. of Canada Ltd., New Toronto. Double-page, two-color advertisements in furniture, hotel and hospital journals are telling them about it.

The advertisements feature the new Goodyear plant nearing completion at New Toronto, Ont. The plant will be devoted to the manufacture of Airfoam and Pliofilm. An architect's sketch of the large factory provides the advertisement's main illustration, while copy deals with the product itself.

Furniture factories were given a first-hand preview of Airfoam and its applications when Goodyear sent out a miniature "factory on wheels," a travelling showroom.

Harold F. Meech has been appointed assistant to the manager, footwear sales, of Dominion Rubber Company Limited, at the company's head office in Montreal, according to an announcement by C. B. Parsons, manager, footwear sales. Mr. Meech was born in Westboro, Ont., and educated in Toronto, attending the University of Toronto prior to joining the staff of Dominion Rubber in 1935. In the interval to his latest appointment, he has worked in various capacities in the company's footwear division.

For the second consecutive year, the footwear plant of the Dominion Rubber Co. at St. Jerome, Quebec, has won the National Safety Council first place award in the international safety contest, Group A, of the rubber industry, the contest which takes in every major plant in the United States and Canada. The St. Jerome plant, with 1,800 employees working through two shifts, attained a frequency rating of .30 in the contest which ended on June 30 last. Canadian Lastex, Ltd., was one of the three first place leaders in the Group B contest.

The first semi-monthly meeting of the Advertisers' Guild of Toronto met recently at the Royal Ontario Museum, where they heard a challenging address by E. G. Taylor of the Viceroy Manufacturing Co. on the subject of present day laxness in business and sales practices. Mr. Taylor highlighted such well-known examples as the sales-clerks who ignore the potential customer, the salesmen who no longer bother to give service, and the direct mail advertiser whose lists bristle with duplications and "dead" names.

Low Pressure Tire Sales

With nearly a million units sold in its first year of production, the new low pressure tire of the U. S. Rubber Company has set a record for the number of special tires sold within a single year. Introduced about a year ago, demand is exceeding supply, according to the manufacturer. The tire utilizes a principle of increased air capacity at lower air pressure. This is said to result in greater riding comfort. In addition, the tire places more "working" surface on the road which makes for greater controllability and safety.

Production Conferences Held

Godfrey L. Cabot, Inc., of Boston, Mass., recently held an extended six day meeting between sales and production heads, and sales representatives, at the Pampa, Texas, Southwestern headquarters of the Cabot Co. The meeting was called to discuss new fine furnace carbon blacks, production schedules, the current carbon black shortage, and general production and sales policies. Considerable time was given over to detailed inspections of channel and furnace type carbon black plants in the Texas Panhandle.

Scrap Rubber Pile Destroyed

Approximately 7,500 tons of whole tire scrap maintained by the Pequanoc Rubber Co., of Butler, N. J., at one of its scrap piles, was completely destroyed by fire on October 23, with damage estimated at about $250,000. Sparks and smoke are said to have covered a three-mile area, with the flames leaping 500 feet in the air.

for the beating an iron cord bushing gets...

Perbunan can "take it"!

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THE RUBBER THAT RESISTS OIL, COLD, HEAT AND TIME

Enjay Company, Inc., 15 West 51st Street, New York 19, N. Y.; First Central Tower, 106 South Main Street, Akron 8, Ohio; 221 North LaSalle St., Chicago 1, Illinois; 378 Stuart Street, Boston 17, Massachusetts. West Coast Representatives: H. M. Royal Inc., 4814 Loma Vista Avenue, Los Angeles 11, California. Warehouse stocks in Elizabeth, New Jersey; Los Angeles, California; Chicago, Illinois; Akron, Ohio; and Baton Rouge, Louisiana.

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The spot the cord enters the electric iron is where a rubber bushing takes a beating! It must withstand intense heat . . . constant flexing . . . moisture from steam irons . . . and rough-pull usage.

In introducing its post-war steam iron the SILEX COMPANY wanted an *improved* bushing to meet these requirements. Their engineers worked with the research development men of the ACUSHNET PROCESS COMPANY and, after careful testing, *a Perbunan cord bushing* was selected.

HERE'S WHY: Perbunan nitrile rubber *more than meets* the rigid tests of the Underwriters' Laboratories . . . and provides exceptional resistance to deterioration from heat, moisture, aging, flexing and rough handling.

Perbunan also has a new color stabilizer that keeps even the most delicate shades constant . . . with no discoloration of the fluids or materials it contacts.

Whatever rubber problem you may have, our experts will gladly help you solve it. Please write to our office nearest you.

NEW RUBBER GOODS

Gripco Rubber Chains

New type chains and mud hooks, bearing the name Gripco, are now being manufactured by Stevens Safety Grip, Inc., Lackawanna, N. Y. Employing a

slotted rubber strap rather than metal links, the new chains are said to eliminate chain rattle, car vibration, and constant breakage of links. They are also said to be harmless to tires because no metal touches the tread or sidewall. The Gripco Rubber Chain consists of six deep slotted rubber straps held tightly across the tire tread by two self-centering steel rings, one on either side of the wheel. Bolt hooks and adjustable nuts make attachment quick and easy. When roads ice up, special ice cleats, sold by the same company, may be slipped underneath the straps merely by loosening the nuts.

Rubbermaid Dog Dish

A new dog dish made of synthetic rubber has been placed on the market by the Wooster Rubber Co., Wooster, Ohio. The dish, called the Rubbermaid Dog Dish, is eight and a quarter inches in

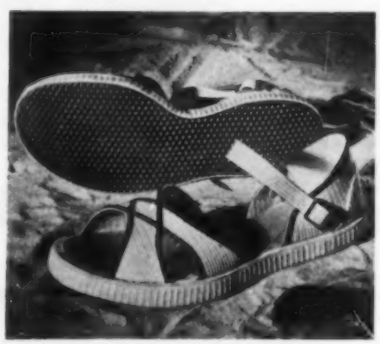
diameter by two and a quarter inches deep. Available in red and green, it is said not to soften under hot water, soap, grease, milk, etc. The company also claims that the dish will resist tendencies to slide on floors and will not scratch or mar furniture.

Jiffy Shoulder Guards

Jiffy Shoulder Guards, simple but effective devices for relief from the cutting and strain of tight shoulder straps, have been introduced by the I. B. Kleinert Rubber Co., New York City. The guards are sturdy, inch-wide straps cut three inches in length and rounded at both ends. Plush fabric lines the underside while nude shade, rayon satin is used for the top surface. These two fabrics are fused with rubber, sufficiently thick and substantial to sustain the strain of tight shoulder straps.

Newport Locker Sandal

The Mishawaka Rubber & Woolen Mfg. Co., Mishawaka, Indiana, has restored the Newport Locker Sandal to the Ball-Band line for the first time since the war. This all-rubber sandal is ideal for beach, pool, locker room, or general wear around the house. Buoyantly soft sponge rubber soles are sealed all around so that water, dirt



and germs can't get in. The sandal features a sweatproof Sta-Kleen insole and a special non-slip sole. It is white with black trim and comes in both men's and women's sizes.

Flexible Adhesive 1711-R

A new synthetic rubber and resin-base flexible adhesive, designated only as 1711-R, has been developed and introduced by Swift & Co., Chicago, Ill. The new adhesive may be used for gluing foil, leather, cellophane, coated paper, fabrics and almost all other covering materials where a strong and prolonged tack is desired. It will adhere to practically any surface. including asphalt, cork, wood, steel, aluminum, tin, glass, and natural or artificial casings. One of the two surfaces being bonded, however, must be non-moistureproof. One of the principal advantages claimed for the new material is its prolonged tack. Within 15 to 30 seconds, depending upon the thickness of film and type of material, it develops an extremely high degree of stickiness which is retained for a long time.

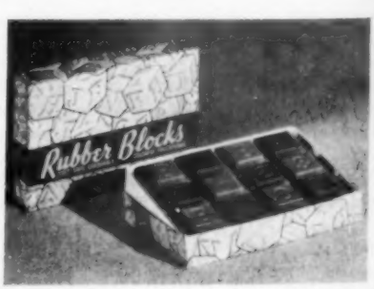
Firestone Velva-Flo Aerator

An artificial aerator which fits onto ordinary kitchen faucets and makes possible aerated water in the home has been developed and introduced by the Firestone Industrial Products Co., Akron. Called the Velva-Flo Aerator, it forces tap water through more than 1,000 tiny holes

to thoroughly mix it with air. The aerator consists of two small rubber cylinders, one of which fits on the faucet. In the assembled unit is a perforated brass disc that converts the water flow into a series of needle-like, high-pressure jets. These jets are directed against several small screen sections which convert them into a mass of splashing water. Firestone is also producing aerators that can be attached to rubber hose sections for use in beauty parlors and baths.

Earlcraft Rubber Blocks

A new line of natural sponge rubber blocks, with each set including the complete alphabet plus numerals and animals, has been introduced by Earl & Arlington, 770 Mission St., San Francisco 3, Calif. Bright blue and red in color, the blocks are washable and repeated washings will



not injure the attractive colors. The use of sponge rubber for these blocks eliminates the possibility of cutting or bruising tender skin due to hard, sharp edges. Earlcraft Rubber Blocks, as they are called, are packed 6 or 12 to the box.

Accelerators
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Antioxidants

A Complete Line of Approved Compounding Materials

The C. P. Hall Co.
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Silicone Mold Lubricant Speeds Release Improves Tires

DC SILICONES

PHOTO COURTESY THE MOHAWK RUBBER COMPANY, AKRON, OHIO

DC MOLD RELEASE EMULSION NO. 35

FOR CLEANER MOLDS

The Dow Corning Silicones used in making DC Mold Release Emulsion No. 35 are chemically related to glass and are, therefore, exceptionally heat-stable materials. The silicone surface formed over molds by spraying them with DC Mold Release Emulsion No. 35 does not break down to form carbon deposits after hundreds of hours at vulcanizing temperatures. It also prevents the adherence of mold dirt to metal surfaces. Consequently, clean molds stay clean for an incredibly long time.

FOR BETTER FINISH

Cleaner molds and more effective lubrication of mold surfaces improves quality—gives high polish to sidewalls—reduces surface blemishes to a minimum.

FOR FEWER REJECTS

DC Mold Release Emulsion No. 35 selectively wets metal surfaces and it is not easily picked up by synthetic rubbers during plastic flow. There is, therefore, less likelihood of non-knits and fold-overs.

FOR EASIER OPERATION

DC Mold Release Emulsion No. 35 is an easy to handle water emulsion applied by spraying in the usual manner with conventional equipment. It is effective in very high dilutions ranging from 1 part of the emulsion in 50 to over 150 parts of water, depending upon the equipment used. There are no objectionable odors or hazards involved in handling DC Mold Release Emulsion No. 35.

For further information, send for leaflet No. V 5-1.

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NEW EQUIPMENT

Goodman Rubber Dusting Machines

Two new types of rubber dusting machines, one a pressure spray machine and the other a powder dusting machine, have been made available by G. F. Goodman & Son, Richmond St. and East Columbia Ave., Philadelphia 25, Penna.

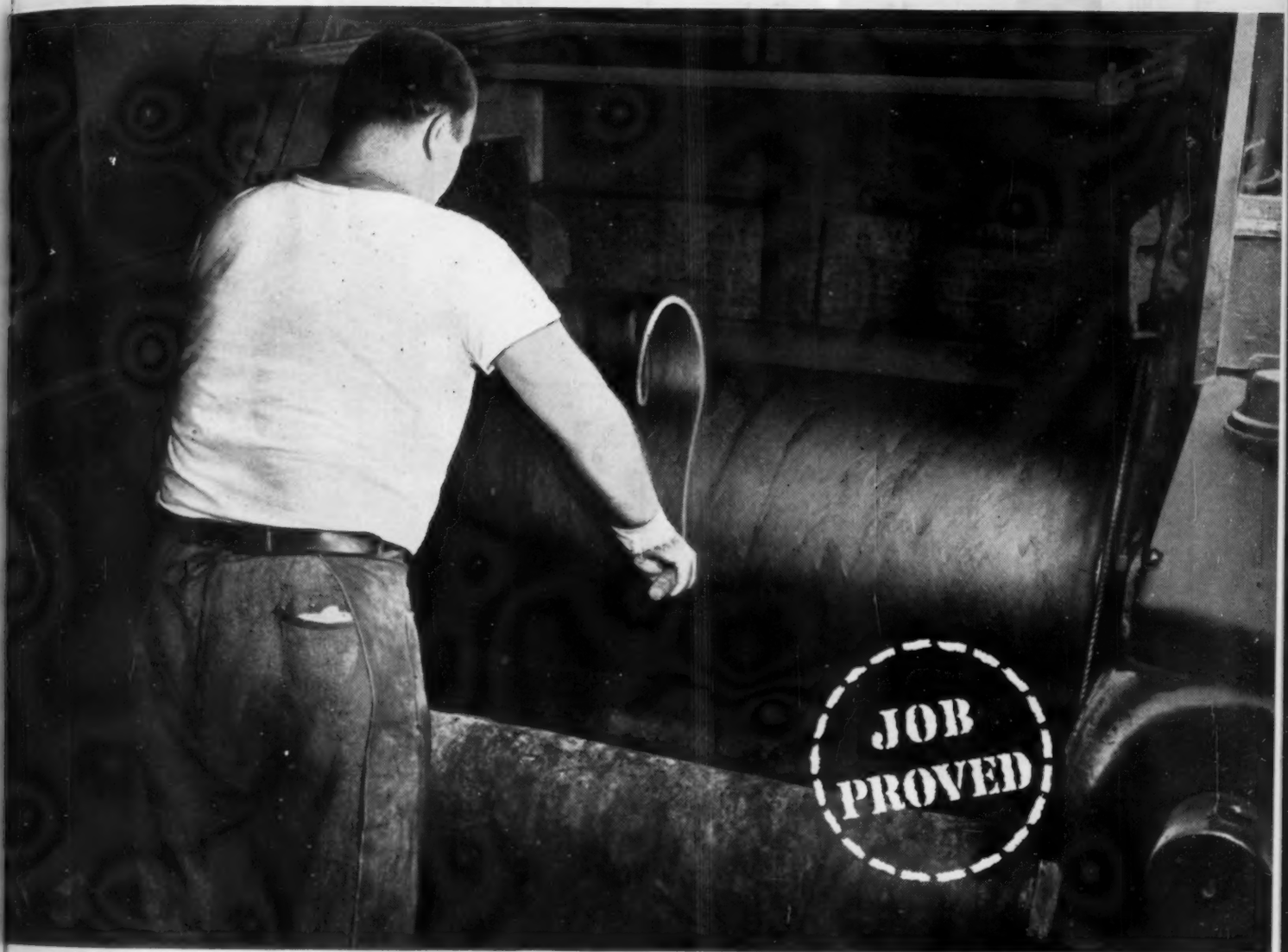
The pressure spray machine brings water dispersed powder to the head of the rubber extruding machine. A powerful gear pump draws the solution from a reservoir in the base of the machine and feeds a pressure spray ring directly onto the extruded rubber strands. Excess liquid is removed by a bumping roll and air blast, and drains back into the reservoir for reuse. The spray, bumping action, and air blast are said to have a beneficial cooling effect on the rubber strands.

The powder dusting machine, illustrated herewith, is helpful in correcting a troublesome dust condition at the extruder. A supply of powder is stored in the base, lifted by a bucket conveyor and discharged upon the extruded rubber strands, the unused powder dropping back into the base. The dusted strands then pass over a bumping roll and through a blast of air to remove the excess powder, which also drops into the base. Continuing out through the exit hole, the strands pass over the feed roll and into the work pan.

In use, the powder dusting machine is merely rolled up against the extruder so that the felt gasket makes a joint. The rubber strands are then pulled through until they lie on the feed roller. The top cover of the unit is hinged to permit instant inspection or to replenish the powder supply.

A new transmitter, identified as **Transmitter Model 42,** for use in the pneumatic transmission of industrial process measurements such as flow, static or differential pressure, liquid level, temperature or humidity, has been introduced by the Foxboro Co., Foxboro, Mass. It is an indicator-type instrument, available with either an eccentric or concentric scale, both being designed for quick and easy reading.

Easy to Handle!



SUN RUBBER-PROCESSING AID...

Gives Desired Softness, Speeds Up Milling by 15%

A manufacturer of hose, gasketing, and other mechanical goods was using cottonseed and paraffin spindle oils as softening agents, but had considerable difficulty in getting the desired product softness.

A Sun Engineer recommended a specially refined Sun rubber-processing aid, a carefully selected group of hydrocarbons that have a natural affinity for rubber.

The desired softness of 20 on the Shor Durometer was readily obtained when the plant switched to this Sun "Job-Proved" material. The rubber was much easier to handle, and milling time was reduced by 15%, with savings in labor and power.

Sun rubber-processing aids are highly compatible with natural and synthetic rubbers. They eliminate blooming, cracking, hardening or bleeding. For modern "Job-Proved" rubber-processing aids, call your nearest Sun office.

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Hand Grip Rubber Gauge No. 3-B

Height .....9"	Length .....9¾"	Range .....½"
Depth of Throat ...6½"	Dial 50 Divisions Each Div. 1/1000"	Weight ....4 lbs. Frame . Aluminum

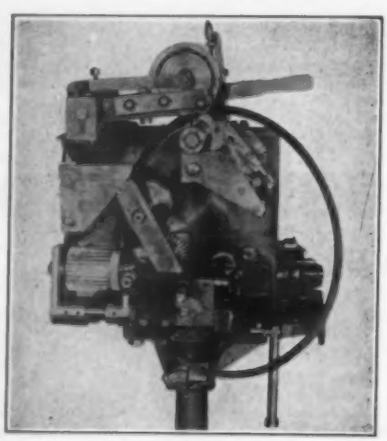
Designed for gauging stock as it is coming from the calender.

FRANK E. RANDALL CO., Waltham 54, Mass.

Utility Crimper Type Flipper

for

Truck and Large Balloon Tires



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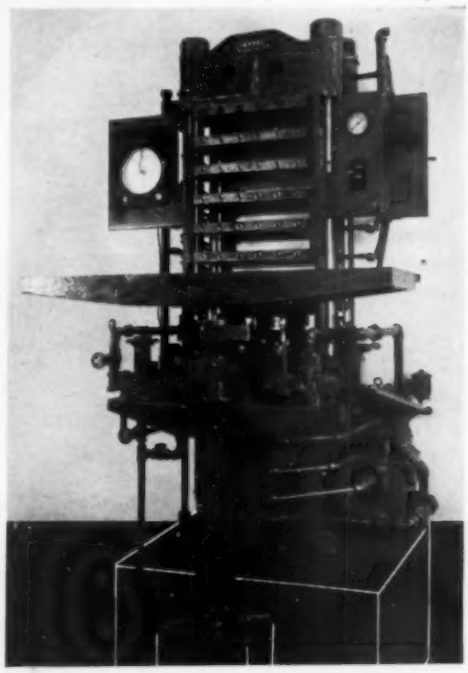
New Farrel-Birmingham Molding Press

Several special features that contribute to unusually fast and precisely controlled performance, as well as economy of operation and durability of construction, have been incorporated in a new 24 by 24-inch six-opening hydraulic compression press developed by the Farrel-Birmingham Co., Inc., Ansonia, Conn., for molding rubber and plastic articles. Initial pressure is 2,000 lbs. psi which gives a plate pressure of 614 lbs. psi, or a total capacity of 177 tons, with maximum deflection over the platen area of .005".



View of the new Farrel press.

The motor-driven oil pressure pump is a radial piston duplex type, equipped with cooler and filter and mounted on a fabricated-steel oil tank on the floor back of the press. Its capacity gives the following operating speeds: Closing, 59" per minute; pressing, 3" per minute; lift table rise, 231" per minute. Lift table descent is by gravity. Ram operation is by a four-way valve equipped with hand lever and the lift table is operated by separate hand lever valve.

Automatic controls include the blow-down timer which gives intermittent release of condensation from the platens. Next to this timer on the right panel is the pressure gauge which has start and stop buttons beneath it. By adjustment of the pump the platen pressure may be set at any point from zero to maximum. On the left panel is the temperature control which is connected to a condensation chamber. This device automatically maintains even heat in the platens and has removable charts for continuous temperature recording.

In over-all construction, the press is extremely sturdy. Top and follower crossheads are of cast Meehanite metal and the bottom cross-head integral with the cylinder is made of steel. The platens are of rolled, silicon killed steel, smooth-tool finished on the working surfaces, and accurately drilled, tapped and plugged for steam circulation.

We PROCESS LINERS of All Types ★

We also manufacture Mold Lubricants for use with synthetic as well as natural rubber.

A Note or Wire Will Bring You Prices and Full Data Promptly

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WATER-PROOF
CALL AT YOUR CONVENIENCE
OUR ENGINEERS WILL GLADLY

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Commercial Rubbermakers' Sulphur, Tire Brand, 99½% Pure

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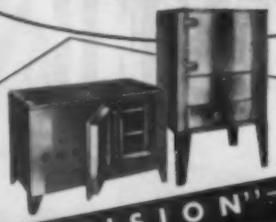
A Remarkable ACHIEVEMENT



"PRECISION" — FREAS

DUAL Hydraulic THERMOSTAT

Representing the most significant development in thermostat design in forty years, the new "Precision" DUAL Hydraulic Thermostat offers a positive, double margin of control safety, which makes long run constant temperature tests a routine procedure. The extra protection afforded, during these "life-time" tests, which may require weeks or even months of continuous cabinet operation, safeguards valuable materials and cultures, and virtually assures the completion of this type of test without interruption and without loss of time.

The Dual Hydraulic Thermostat is standard equipment on all "Precision"-Freas Mechanical Convection ovens and incubators at no additional cost.

Write for Bulletin 345 which gives complete details on this exceptional engineering development.

Precision Scientific Company

Scientific Research and Production Control Equipment

USED BY RUBBER COMPANIES FOR THESE JOBS

Laboratory and Experimental Work
Synthetic Rubber Moulding
Plant Control
Vulcanizing

Rubber companies are saving money by using Preco Presses for experimental and small production runs — eliminating the need for interrupting production on larger presses. The Preco Press is ideal for many types of plant control jobs as well as in the laboratory for research.

The two-stage hand pump develops 40,000 pounds pressure on 8"x8" electrically heated, water cooled platens. 6¾" x 12" platens as well as steamheated platens are also available. The press can be equipped with a third platen to double the platen capacity. The pressure and temperature heat controls are extremely accurate. Maximum opening between platens is 8 inches.

PRECO INCORPORATED
982 E. 61st St., Los Angeles 1, Calif.

PRECO Hydraulic PRESS

Eriez Permanent Non-Electric Pulley

The first completely self-energized magnetic pulley requiring no electric current to generate a magnetic field has been developed by the Eriez Manufacturing Co., Erie, Penna. The pulley, which is said to open new possibilities toward easier removal of fine ferrous

particles from resins, carbon blacks, abrasives, etc., is adaptable to all chemical applications requiring automatic separation of magnetic from non-magnetic materials conveyed on a belt. It will work effectively through belts of rubber, canvas, leather or any other non-magnetic material. In many cases, the new pulleys have been placed in hazardous locations where possible sparking has precluded the use of electrically powered magnetic separators. Since moisture, heat or cold does not affect their operating efficiency, they may be installed in any location regardless of the elements or unusual operating conditions.

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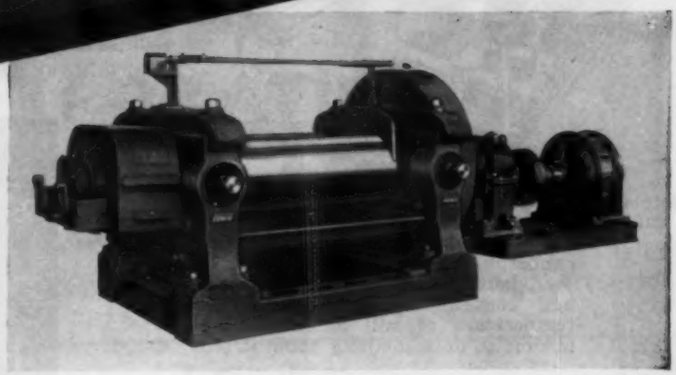
RUBBER & PLASTICS HEAVY DUTY MILLS



STURDY, dependable and built for long life, EEMCO Mills are made in standard sizes from the 12-inch Laboratory Mill up to and including an 84 inch Mill. Furnished as single units or for operation "in line" of two or more. Floor level drives are provided when wanted. Write EEMCO for your Rubber or Plastics Processing Machinery needs - - - early deliveries are now being made.

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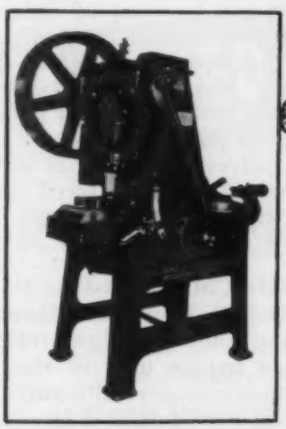
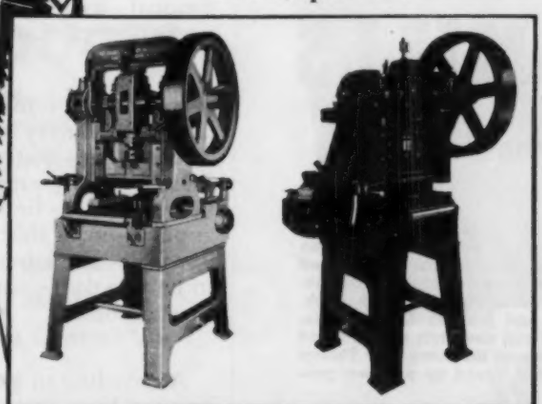
RUBBER CUTTING MACHINES

NEW Proven features for continuous volumetric control and stripping for HEELS-SOLES-TAPS and other molded products.



MODEL A-1



MODEL A-2 MODEL A-3

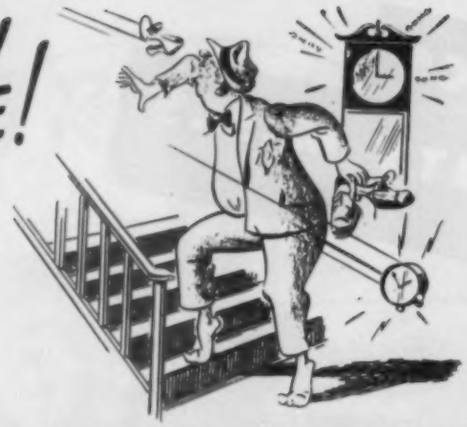
- Model A-1 For HEELS at high speed production, or short runs.
- Model A-2 For Multiple HEELS, HALF and FULL SOLES with stock grain.
- Model A-2S (Not Illustrated) For cutting crosswise of grain of stock.
- Model A-3 For Multiple HEELS and TAPS with or across stock grain.

Here is the *Rubber Cutting Machine* that will *cut with* or across the stock grain, either singular or in multiples—from a strip of stock direct from the warming mill.

WRITE FOR FULL PARTICULARS

Production Machines Since 1896

The James COULTER Machine Co.
BRIDGEPORT • CONNECTICUT • U.S.A.



But it is too late when lumps appear in the calendering rolls . . . a pretty sure sign that the surface temperature of the rolls is too high and you are scorching rubber. With the Cambridge Roll Pyrometer you can accurately, quickly and conveniently check the surface temperature of still or moving rolls in time to do something about it.

The Cambridge Roll Pyrometer is an accurate, dependable, rugged quick-acting instrument. Send for bulletin 194 S.

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CAMBRIDGE
ROLL • NEEDLE • MOLD
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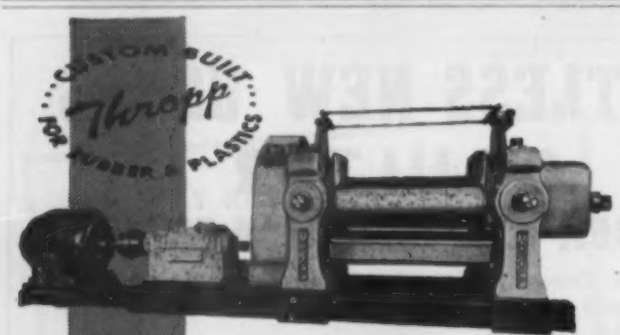

New Hi-Speed MILLS

22" & 22"x60" Extra Heavy Duty

Extra Heavy Duty Individual Motor Driven Mill with 15" diameter journals, having 150 H.P. enclosed herringbone gear drive. Machine is equipped with solid bronze lined bearings having oil closure seals on side of the boxes facing the rolls to prevent oil contamination of the stock. Steel cut connecting gears and Johnson Rotary Joints. Manual mechanical lubricator and new style guides bored to fit the rolls. This is just one of the many new Thropp precision built mills designed to speed up post war production.

West Coast Representative
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Los Angeles, Cal.

Thropp

WM. R. THROPP & SONS CO.
Trenton, N. J.

Palmer-Shile Book Truck for Rubber

A new book truck designed especially for curing rubber in process, and which can also be used in the production of plastics or other products where the rapid drying or curing of sheets or parts is essential, has just been announced by the Palmer-Shile Company, 12657 Mansfield Avenue, Detroit 27, Michigan. Constructed of a heavy gauge steel with welded all steel shelves, reinforced to withstand rough usage, provide additional rigidity and assure longer life. Long, sturdy extension springs permit easy raising and lowering of individual shelves. When raised, shelves are automatically held up in tilted position to permit operator complete accessibility from any position. Equipped with metal or rubber tired wheels or casters, and can be built with legs or with skids to accommodate power lift or hand-operated trucks. Strength of shelves in accordance with individual weight requirements. Manufactured in all sizes to meet exacting production requirements.

New Palmer-Shile Book Truck

Introduction of the **Mikro-Collector** by the Pulverizing Machinery Co., Summit, N. J., announced the invasion by that company into the dust collection field. Major contribution to the field of this new unit is said to lie in the first commercially successful application of hard-pressed wool felt as a filter medium in industrial air and gas filtration. It is also said to handle dusts containing a high percentage of moisture or oil.

A new line of **gearless pumps** for general industrial use has been announced by the Eco Engineering Co., Newark 1, N. J. Chief among improvements featured by these pumps is their new double impeller design which gives a strong flow against pressure. The impellers can be adapted to the operation involved and special impellers can be provided to suit the particular characteristics of the liquid being handled.

Trade Mark

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CORPORATION
78 GOODYEAR AVENUE
MELROSE 76, MASS.

BRANCHES: CHICAGO, ILL. AKRON, O. DETROIT, MICH. LOS ANGELES, CAL.

Natural and Synthetic

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Continuous Extruding Machines for the Rubber, Plastic and Chemical Industries

Continuous Vulcanizing Machines for Rubber Insulated Wire

Plastic Insulated Wire Machines

Light Wire and Cable Capstans

Strainers **Motorized Take-Ups**

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CONTINUOUS VULCANIZING MACHINE

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PATERSON 3, NEW JERSEY

DAREX high styrene resins are good in GR-S compounds and outstanding in natural rubber compounds. They plasticize the compound during processing and reinforce the finished stock without reducing the important "rubbery" properties. By using small amounts of these high styrene copolymers, you can

1. Produce products having improved physical properties
2. Save processing time
3. Reduce seconds and rejected products
4. Conserve scarce material
5. Save on compound cost

DAREX Copolymers No. 3 and No. X-34 are noted for maintaining high hardness, modulus, tensile, and elongation; for improving tear, abrasion, and flex-cracking resistance. Compression set and permanent set are reduced while resilience and flexibility are increased over a wide range of temperatures. Resistance to oils, chemicals, and aging are improved. Electrical properties of the copolymers are excellent—including resistance to moisture and high voltage.

Write to us for technical bulletins and for suggestions on your specific applications. Our technical service men will be pleased to help you in your development work.

*T. M. REG. U. S. PAT. OFF.

DEWEY AND ALMY CHEMICAL CO.
ORGANIC CHEMICALS DIVISION
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REVIEWS

BOOKLETS, CATALOGS, etc.

Blueprint for Industry, Part IV, Continuous Extrusion Takeup Equipment. Industrial Ovens, Inc., 13825 Triskett Rd., Cleveland, Ohio. 8½ x 11 in. 12 pp.

Complete with engineering drawings and specification tables, and fully illustrated, this booklet gives detailed, analytical descriptions of the most modern methods being used in continuous extrusion takeup operations. The newest complete extrusion systems for wire, cable, monofilaments or tubings are given comprehensive treatment, including a high production wire extrusion system with selective speed ranges up to 2,000 fpm. Also included are analytical descriptions of large-cooling capacity plastic tubing takeups with water submerged capstans, plastic takeups for "in line" operations on uniform cross section materials, and other equipment for any type of extrusion operation. This is the first booklet ever to be published dealing with all the various types of equipment required in extrusion takeup operations.

•

Properties and Uses of Some Novel Organic Peroxides. By Reginald P. Perry and Kenneth P. Seltzer. Union Bay State Chemical Co., 50 Harvard St., Cambridge 42, Mass. 8½ x 11 in. 16 pp.

The manufacture, properties, and some commercially important uses of five novel organic peroxides are described. All but one of these new peroxides contain the tertiary butyl group. Tables are included which outline the physical properties of these peroxides, and their effect in polymerization reactions. Using the same chemical reactions described for the manufacture of these five, many peroxides of different structure and properties are possible, the bulletin states. Such permutation will in time lead to the commercial availability of a wide range of "tailored" peroxides designed to the specific needs of industry.

•

Continuous Blowoff Systems. Cochrane Corporation, Philadelphia 32, Pa. 8½ x 11 in. 16 pp.

Five different flash-tank and heat-exchanger systems for recovering the otherwise wasted heat in boiler blowoff water are discussed in this pamphlet. Two pages are devoted to describing the detailed calculation of savings under actual plant conditions and a quick estimating chart is provided for ready calculations of dollar savings possible, together with a roughly estimated cost of equipment. Two thermostatically-controlled systems are described for automatically proportioning the rate of blowoff to makeup water.

•

Federated Zinc Dust. Federated Metals Division, American Smelting and Refining Co., 120 Broadway, New York 5, New York. 4 x 8 in. 4 pp.

This pamphlet indicates the many different applications of zinc dust from its use in rubber processing to its use in sulfa drugs. Zinc dust paints are said to offer complete protection from rust for both iron and steel surfaces and in preventing corrosion of the hulls of ships or other surfaces coming into contact with brine.

•

Hydrocarbons. (Bulletin No. 129A). Chemical Products Department, Phillips Petroleum Co., Bartlesville, Okla. 5 x 8 in. 32 pp.

This 1947 Supplement describes new hydrocarbons which have been offered for sale by the company since the publication of "Phillips Hydrocarbons," Bulletin No. 129. A complete alphabetical listing of all Phillips hydrocarbons is given in the product index.

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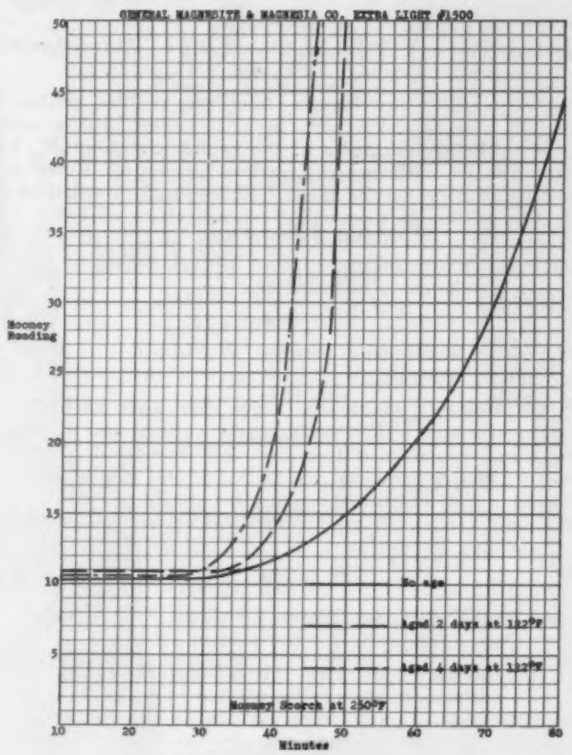

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REVIEWS (CONT'D)

Tank Lining Compound For Corrosive Proofing. Union Bay State Chemical Co., 50 Harvard St., Cambridge 42, Mass. 8½ x 11 in. 8 pp.

Complete information about UBS tank lining compounds is to be found in this technical bulletin. Detailed instructions are given on the preparation of metal surfaces before the application of tank-lining compounds, the application of primers, tie cement, lining cement, putty and the curing of the lining job. A section on repairing natural rubber and synthetic rubber linings is included, and matters of ventilation and coverage are also discussed. Tables of chemical resistances are included, so that the user of tank lining compounds may judge which compound is best suited to his needs.

•

Resinex. Harwick Standard Chemical Co., Akron Savings & Loan Bldg., Akron 8, Ohio. 8½ x 11 in. 24 pp.

This booklet provides a reference to the polymerized aromatic resins which have been developed by the company to meet the requirements of the rubber compounder. Tables are provided outlining the various grades of Resinex, and the physical properties these different grades will impart to various stocks. Resinex-GR-S as a reclaim extender is discussed, as is the use of the product as a binding agent in the manufacture of mastic floor tile. A listing of suggested uses for Resinex is included.

•

Processing Equipment. Sprout, Waldron & Co., Muncy, Pa. 8½ x 11 in. 8 pp.

Such items as double disc mills, burr stone mills, crushers, crusher-feeders, roller mills, knife cutters and mixing and blending systems are described and illustrated in this catalogue. Data on capacity, maintenance and production are included. Supplementary equipment such as reels, sifters, magnetic separators and methods for materials handling by air are also discussed.

•

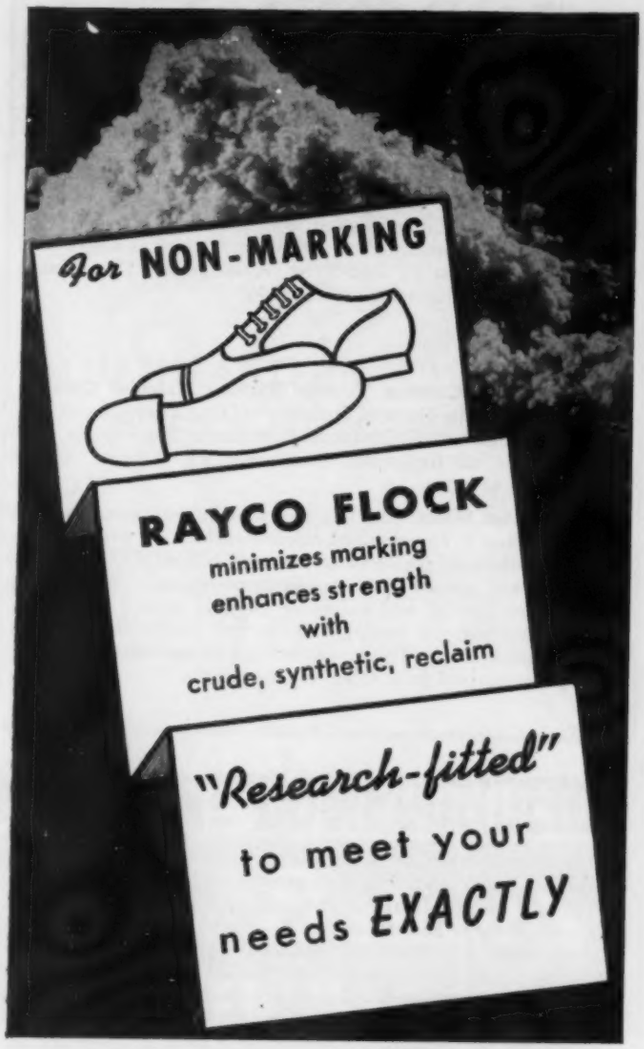
New Gurley Stiffness Tester. (Bulletin No. 1430). W. & L. E. Gurley, Troy, N. Y. 8½ x 11 in. 4 pp.

This booklet illustrates the manner in which the company's stiffness tester can be applied in testing many different materials ranging from plastics to paper, its range and capacity and the standard samples used are discussed. General details of the motor-operated tester are included. One section is devoted to a listing of Gurley testing instruments and test weights.

FOR RESISTANCE TO CUT AND CRACK GROWTH USE PHILBLACK-O

FOR FURTHER DETAILS, SEE AD ON PAGE 128

Rayco Flock



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Digest of Literature on Dielectrics. Division of Engineering and Industrial Research, National Research Council, 2101 Constitution Ave., Washington 25, D. C. 8 x 10¾ in. 120 pp.

The latest issue of this dielectric digest (formerly called "Contributions of the Chemist to Insulation Research") is the tenth to be issued. As usual, it contains a number of articles bringing up to date developments in the various branches of the dielectric art, the data on rubber insulation being furnished by J. T. Blake and R. Lyle of the Simplex Wire and Cable Co. Because of the increasingly wide distribution of this digest and because of certain changes in policy concerning it, a review of the history of the Committee on Chemistry and Physics (formerly called the Committee on Chemistry), which is responsible for the preparation of the digest, is included. The present digest covers developments during 1946.

•

Comparison of Calcene T with Various Calcium Carbonate Pigments in Natural Rubber. (Data Sheet No. 47-6). Columbia Chemical Division, Pittsburgh Plate Glass Co., Fifth Ave. at Bellefield, Pittsburgh 13, Penna. 8½ x 10¾ in. 42 pp.

As indicated by its title, this technical bulletin compares the use of Calcene T (precipitated calcium carbonate) with various calcium carbonate pigments in natural rubber. The specific pigments are named and specifications given. Three base stocks were utilized and extensive physical results are given. Various methods of mixing utilized are described, and data is given on curing. The complete data is presented in tables and is summarized in a series of bar graphs.

•

The Apparent Density of Light Magnesium Oxides. (Bulletin 47-3). General Magnesite & Magnesia Co., Architects Bldg., Philadelphia 3, Penna. 8½ x 11 in. 3 pp.

No proper definition exists for the term "Light Calcined Magnesia," and accordingly the term is sometimes misused. Charts are included in this technical bulletin showing graphically the weights per cubic foot, loose and compacted, of various commercially available "Light Calcined Magnesias." The apparent densities of General Magnesite's "Extra Light Calcined Magnesia" are indicated to be slightly over 4 pounds per cubic foot (loose) and slightly less than 8 pounds per cubic foot (compacted).

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FOR FURTHER DETAILS, SEE AD ON PAGE 128

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Plastic Scrap

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Cabot Pine Products. Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass. 8½ x 11 in. 32 pp.

This latest Cabot technical bulletin deals with pine products made by the company's Retort Chemical Division, and is designed to fit into the special loose leaf cover furnished by the company some time ago. Specifications are given in each instance, and the materials covered include light pine, medium pine, heavy pine, industrial pine, and commercial pine tar oils; Solvol; Solventene; Dipentene; destructively distilled wood spirits turpentine, pyroligneous acid, and charcoal. A number of definitions of naval stores products is included, as are various testing procedures used.

•

Positex. By C. M. Blow. Published by the British Rubber Development Board, 19 Fenchurch St., London, E.C. 3, England. 5½ x 8½ in. 12 pp.

The properties and applications of Positex, the relatively new form of natural rubber latex with reversed charge, are outlined and briefly discussed in this pamphlet, first of a planned series. Among applications covered are rubberizing of carpets, impregnation of felt, production of embossed designs, and the use of the material as an adhesive. Patents covering Positex are the joint property of the Wool Industries Research Association and the British Rubber Producers' Research Association.

•

Ucon Fluids and Lubricants. (Form 6500). Special Products Division, Carbide and Carbon Chemicals Corp., 30 East 42nd St., New York 17, N. Y. 8½ x 11 in. 24 pp.

Properties and uses of the several series of Ucon fluids and lubricants (polyalkelene glycols and derivatives) are discussed in detail in this booklet. These relatively new materials are finding wide use in machine lubrication and in hydraulic applications, as well as in the rubber, textile, leather and other industries. Typical uses of the materials by industry are discussed. Technical data on the various series is given.

•

Natac: A Bloom Inhibitor. J. M. Huber Corp., 342 Madison Ave., New York 17, N. Y. 8½ x 11 in. 4 pp.

This technical bulletin describes Natac, the company's new bloom inhibitor for natural rubber and mixtures of natural rubber and GR-S. Physical and compounding characteristics of the material are given, as well as several typical compounds showing suggested fields of application in various rubber products. Data on tensile, modulus, elongation, T-50, and bloom is shown.

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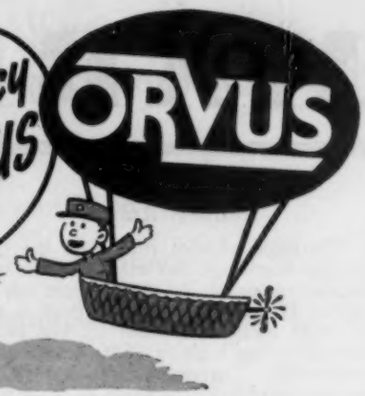

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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, NOV. 17, 1947

Natural Rubber

The price of spot rubber on the Commodity Exchange has moved in the spectacular range of 563 points since our last report (October 14), rising from a price of 19.37 cents on October 15, low for the period, to the high of 25.00 cents on November 12. The major factor contributing to the steady rise in price of spot is the high consumption rate which is expected to continue through the balance of the year, despite all previous predictions of a sharp falling off in the production of various types of rubber products. Even the tire field is maintaining its near-capacity rate.

The sharp jump in prices which occurred during the first few days of this month were due to rumors emanating from London and Singapore to the effect that the Anglo-American trade pact negotiated at Geneva included an American commitment to reduce the required proportion of synthetic rubber in popular-size tires. This rumor had absolutely no basis of fact, as explained in detail elsewhere in this issue.

The supply situation is not too bright, in spite of increased shipments from the Far East. Shipments of rubber from Malaya during October, for example, amounted to 96,584 long tons, exceeding the peak of 95,961 tons reached last May. Malayan shipments in September amounted to only 71,690 tons, while August shipments totaled 72,455 tons. Shipments from the Netherlands East Indies are still insignificant due to the still unsettled conditions in that area.

Today's quotations in the outside market, London and Singapore, follow:

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.22½
December	.21⅜
January-March	.21⅛
Thin Latex Crepe:	
Spot	.36
January-March	.34
Thin Brown Crepe, No. 2	.18¾
Ambers, No. 3	.18¾
Flat Bark Crepe	.15½

London Market

(Standard Smoked Sheets)

January-March	21.20 - 21.41
April-June	20.57 - 20.68

Singapore Market

(Standard Smoked Sheets)

December	19.25 - 19.36

Synthetic Rubber

(Dry Types)

Butaprene NXM	.470 - .495
Chemigum 30 N4NS	.400 - .470
Chemigum 50 N4NS	.400 - .470
Chemigum N3	.450 - .520
Hycar OR-25	.400 - .425
Hycar OR-15	.470 - .495
Hycar OS-10	.400 - .425
Neoprene Type E	—— - .650
Neoprene Types CG and AC	—— - .500
Neoprene Types FR and KNR	—— - .750
Neoprene Type S	—— - .320
Neoprene Type NC	—— - .250
Perbunan 18	.390 - .415
Perbunan 26	.400 - .425
Perbunan 35	.470 - .495
Thiokol Type A	.370 - .470
Thiokol Type ST	.750 - .850
Thiokol Type FA	.520 - .620
Thiokol PR-1	.750 - .850

Scrap Rubber

For the first time in many months a demand for scrap rubber has been noted. The situation is reported to be much too much in its infancy to make any clear-cut statement that revival of the market is imminent, but it is the first hopeful sign the market has had in some time. The only active scrap stock at present is natural rubber peelings which bring a steady $42 to $43 per ton for No. 1 Grade. Prices shown below are those which were in effect several months ago:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$18.00
Beadless truck tires	ton	24.00
Mixed truck tires	ton	18.00
Beadless passenger tires	ton	24.00
No. 1 passenger peelings	ton	50.00
No. 1 truck peelings	ton	50.00
No. 2 passenger tubes	lb.	.07½
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06½
Mixed passenger tubes	lb.	.06¼
No. 2 truck tubes	lb.	.07¼
Red truck tubes	lb.	.07
Black truck tubes	lb.	.07
Buffings	ton	18.00

Reclaimed Rubber

Demand for reclaimed rubber, which picked up in September after a lull in June, July and August, the first since the war-time period, has continued during the past month. The steady price of reclaim as compared with the fluctuating price of natural rubber is given as one reason for the present demand. Consumption of reclaim in September, according to the OMD Rubber Division, amounted to 23,879 tons. Current quotations follow:

Tires			
Black, Acid	lb.	.08¼ @	.09¼
Black, Digester	lb.	.08 @	.08½
Peels	lb.	.09 @	.09½
GR-S Whole Tire	lb.	.08½ @	.09
Inner Tubes			
Black	lb.	.12¾ @	.13¼
Red	lb.	.13½ @	.14
GR-S	lb.	.09½ @	.10
Butyl	lb.	.08½ @	.09
Shoe			
Unwashed	lb.	.08¼ @	.08¾

Cotton Tire Fabrics

The renewed demand for cotton tire fabrics experienced last month continues and once again the mills are hard put to meet all requests. Many mills are transferring looms from other products to tire yarn to meet the demand which is almost equivalent to that which prevailed in war-time. Although tire fabric prices remain firm, the price of chafers has been increased by 2 cents a pound. Current prices follow:

Standard, Peeler, 12/4/2	lb.	.7400
Standard, Peeler, 14/4/2	lb.	.7600
Standard, Peeler, 16/4/3	lb.	.7850
Extra Staple, Peeler, 12/4/2	lb.	.8375
Extra Staple, Peeler, 14/4/2	lb.	.8575
Extra Staple, Peeler, 16/4/3	lb.	.8825

Chafers

14.4 oz. (per sq. yard)	lb.	.7350
9.25 oz. (per sq. yard)	lb.	.6925
11.65 oz. (per sq. yard)	lb.	.6650
8.9 oz. (per sq. yard)	lb.	.7075

Cotton

The price of middling uplands on the Cotton Exchange has swung in the range of 225 points since our last report (October 14), high being 34.40 today, November 17, and low 32.15 on October 15, the first day of the new period. The average price of middling uplands for the month of October was 32.39 cents.

Recent world events are largely responsible for the almost consistent day-to-day rise in the price of cotton. Foremost among these is the virtual certainty that the European Recovery Plan (Marshall Plan) will be approved by Congress. Also contributing to the present upward trend is the determination of the Truman Administration to restore or continue price, allocation and export controls.

Still another factor in the cotton price situation was the announcement on November 11 by the Crop Reporting Board that based on conditions as of November 1 the total crop will not exceed 11,505,000 bales. This prediction came as a shock to most observers since an advance of 150,000 to 300,000 bales over the 11,508,000 bales set last month was expected.

Prior to the latest estimate of the Crop Reporting Board, most analysts were of the belief that cotton could not sustain a 35-cent price. Domestic and foreign demand, coupled with the indicated short supply of cotton, is now expected to send the price over that level.

Quotations for middling uplands on the Exchange follow:

	Oct. 17	November 17		
	Close	High	Low	Close
December	31.96	33.83	33.23	33.80
March	32.27	34.02	33.42	33.98
July	31.52	33.00	32.35	32.98

Closing Rubber Prices on New York Commodity Exchange

FROM OCTOBER 15 TO NOVEMBER 17

Date	Spot	Dec.	May	Sept.	Sales
Oct. 15	19.37	18.55	17.50	——	230
16	19.62	18.55	17.80	——	255
17	20.00	19.15	18.37	——	145
18	——	——	——	——	——
19	——	——	——	——	——
20	21.12	20.30	19.25	——	241
21	21.50	20.00	19.10	——	134
22	21.62	20.20	19.05	——	190
23	22.00	20.00	18.75	——	124
24	22.00	19.35	18.20	17.70	67
25	——	——	——	——	——
26	——	——	——	——	——
27	22.25	19.70	18.30	17.85	120
28	23.00	20.43	18.63	18.10	83
29	23.00	20.90	18.85	18.30	110
30	23.00	21.50	18.90	18.40	92
31	23.00	21.40	19.15	18.70	95
Nov. 1	——	——	——	——	——
2	——	——	——	——	——
3	23.25	21.60	19.55	19.10	76
4	——	——	——	——	——
5	23.75	22.65	20.00	19.35	130
6	24.00	22.75	20.25	19.40	93
7	24.00	22.75	20.60	19.75	115
8	——	——	——	——	——
9	——	——	——	——	——
10	24.50	22.80	20.90	20.00	102
11	——	——	——	——	——
12	25.00	22.75	21.00	20.10	116
13	24.50	21.70	20.40	19.45	87
14	23.50	21.60	20.60	19.60	155
15	——	——	——	——	——
16	——	——	——	——	——
17	23.00	21.05	20.30	19.25	78

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Liquid Rubber Latex

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LATEX DISTRIBUTORS, INC.

80 BROAD STREET NEW YORK 4, N. Y.

STATISTICS *Of Interest to the Rubber Industry*

U. S. Imports and Re-Exports of Natural Rubber

	GROSS IMPORTS												
	Natural Rubber (Dry)			Natural Rubber (Latex)			Guayule				RE-EXPORTS		TOTAL NET IMPORTS
Year	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Total Gross Imports Long Tons	Long Tons	Total Declared Value	Long Tons
1936	467,064	152,072,496	14.54	19,852	6,659,899	14.98	1,229	286,552	10.41	488,145	12,581	4,488,223	475,564
1937	574,600	237,307,041	18.44	23,185	10,213,670	19.67	2,694	745,873	12.36	600,479	7,902	3,385,433	592,577
1938	397,620	125,357,730	14.07	11,878	4,147,318	15.59	2,485	623,819	11.21	411,983	5,652	1,799,124	406,331
1939	469,803	167,558,245	15.92	27,438	10,467,552	17.03	2,232	463,345	9.27	499,473	13,125	5,832,618	486,348
1940	780,820	303,117,726	17.33	33,789	14,593,466	19.28	3,634	758,007	9.31	818,243	7,060	3,197,136	811,183
1941	989,329	401,890,393	18.14	34,798	15,965,627	20.48	4,881	1,145,767	10.48	1,029,008	5,376	2,757,872	1,023,632
1942	265,980	112,377,896	18.86	10,646	5,630,667	23.61	5,523	1,660,792	13.42	282,149	10,856	5,913,386	271,293
1943	50,348	31,364,033	27.81	1,890	1,312,202	30.99	7,679	3,636,789	21.14	59,917	22,587	16,446,707	37,330
1944	103,820	73,908,389	31.78	3,091	2,092,211	30.22	6,700	3,351,233	22.33	113,611	9,739	8,712,695	103,872
1945	134,454	95,850,441	31.82	4,773	3,115,853	29.14	10,040	5,963,797	26.52	149,267	9,509	7,201,746	139,758
1946	366,415	222,552,939	27.12	8,421	5,843,085	30.98	5,344	2,859,246	23.89	380,180	7,711	5,331,954	372,469
1945:													
Nov.	11,177	7,844,162	31.33	296	193,252	29.15	739	446,925	27.65	12,212	254	179,321	11,958
Dec.	12,844	9,273,507	32.24	382	248,604	29.15	819	498,604	27.20	14,045	525	349,385	13,520
1946:													
Jan.	18,580	13,515,971	32.48	569	371,857	29.15	446	263,279	26.33	19,595	164	41,992	19,431
Feb.	32,690	23,944,266	32.70	.....	.....	....	318	171,823	24.10	33,008	723	444,400	32,285
Mar.	31,093	22,520,391	32.33	304	328,905	29.15	160	87,344	24.34	31,757	714	488,044	31,043
Apr.	26,234	18,997,757	32.33	1,001	808,463	36.06	874	467,151	23.86	28,109	392	243,952	27,717
May	4,784	3,314,818	30.93	1,052	687,100	29.11	430	219,830	22.82	6,266	422	419,278	5,844
June	8,518	6,132,895	32.15	561	366,165	29.15	466	244,580	23.41	9,545	460	446,253	9,085
July	20,641	13,947,817	30.17	696	451,523	28.96	291	148,442	22.85	21,628	2,457	1,600,600	19,171
Aug.	34,125	18,656,966	24.41	1,231	803,435	29.14	366	193,680	23.06	35,722	1,515	902,005	34,207
Sept.	41,311	22,317,275	24.12	.....	.....	....	425	219,849	23.09	.....	145	81,481	.....
Oct.	45,523	24,745,403	24.27	672	438,938	29.15	691	377,319	24.38	46,886	649	613,424	46,237
Nov.	58,756	30,648,620	23.29	130	85,363	29.24	379	200,270	23.58	59,265	60	29,800	59,205
Dec.	44,159	23,810,760	23.87	2,005	1,501,336	33.43	494	265,679	24.02	46,658	17	20,625	46,641
1947:													
Jan.	92,459	51,035,472	24.64	.....	.....	....	315	169,081	23.65	.....	20	16,644	.....
Feb.	57,771	30,580,942	23.63	2,426	1,550,499	28.52	481	256,760	23.84	60,678	1,991	1,149,953	58,687
Mar.	35,128	19,421,550	24.46	496	324,103	29.15	463	246,573	23.76	36,087	39	23,592	36,048
Apr.	45,453	23,627,600	23.21	34	26,754	34.84	524	282,941	24.09	46,011	26	20,725	45,985
May	91,918	47,208,658	22.93	763	442,050	25.87	345	186,201	24.11	93,026	14	9,169	93,012
June	62,346	28,339,739	20.29	2,825	1,642,417	25.95	554	298,705	24.07	65,725	47	22,998	65,678
July	56,080	22,379,698	17.08	1,407	855,454	25.09	74	27,458	16.55	57,561	421	226,777	57,140
Aug.	43,637	16,127,766	16.93	1,784	960,877	24.48	104	24,768	18.54	45,525	191	118,666	45,334

Source: U. S. Department of Commerce.
Notes: (1) Figures for latex are on a dry weight basis. (2) Figures for re-exports include natural rubber (dry and latex) and guayule.

Natural Rubber
(Including Latex and Guayule)
(All Quantities in Long Tons)

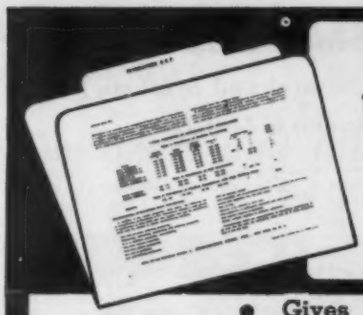
Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1936	488,145	575,000	12,581	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1946	400,687	277,597	4,338	237,467
1945:				
Nov.	7,288	7,575	255	117,543
Dec.	7,884	8,185	92	118,715
1946:				
Jan.	25,143	10,355	209	133,294
Feb.	35,104	10,131	290	157,977
Mar.	35,348	12,792	445	180,088
Apr.	19,847	16,914	190	182,831
May	6,126	17,867	327	170,763
June	23,382	16,466	911	176,768
July	14,942	21,998	222	169,490
Aug.	45,087	28,405	592	185,580
Sept.	46,122	31,123	988	199,591
Oct.	36,735	35,421	106	200,799
Nov.	55,231	37,323	35	218,672
Dec.	57,620	38,802	23	237,467
1947:				
Jan.	102,080	45,328	43	294,191
Feb.	30,318	40,983	1,253	283,479
Mar.	40,437	43,104	509	280,812
Apr.	55,976	43,818	0	292,970
May	42,738	43,018	0	330,960
June	57,055	42,529	311	345,175
July	57,243	40,389	421	131,624
Aug.	44 672	47,289	191	130,040
Sept.	40,447	50,522	174	121,833

Source: 1936-40, U. S. Department of Commerce; 1941 to date, Civilian Production Administration.

U.S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.
(All Quantities in Long Tons)

	Balata		Jelutong		Gutta-Percha & Other Guttas	
Year	Tons	Value	Tons	Value	Tons	Value
1936	535	199,368	6,163	1,296,364	1,568	555,643
1937	354	151,344	7,109	2,017,786	1,122	440,894
1938	509	181,140	9,132	2,944,504	444	204,582
1939	694	265,553	6,640	1,603,418	1,740	539,255
1940	648	300,500	7,451	2,449,137	2,340	1,004,885
1941	924	489,514	8,821	2,954,001	1,783	607,025
1942	1,544	1,107,059	1,200	530,296	804	525,763
1943	1,047	708,701	35	14,840	....	.....
1944	1,012	660,805	88	45,578	10	4,999
1945	1,361	907,253	....	.....	36	21,970
1946	2,281	2,233,065	304	256,169	423	458,064
1945:						
Oct.	130	83,173	....	.....	....	.....
Nov.	303	257,246	....	.....	10	6,547
Dec.	48	58,742	....	.....	18	9,983
1946:						
Jan.	129	121,228	....	.....	....	.....
Feb.	38	35,699	....	.....	5	2,178
Mar.	100	70,315	....	.....	....	.....
Apr.	362	261,098	....	.....	....	.....
May	325	212,899	....	.....	....	.....
June	80	80,006	....	.....	....	.....
July	219	178,564	115	91,412	7	19,839
Aug.	234	249,380	....	.....	4	13,438
Sept.	159	161,937	4	9,337	23	47,147
Oct.	282	367,393	21	29,307	305	216,901
Nov.	152	270,379	28	39,502	3	10,233
Dec.	199	287,167	57	41,757	26	52,096
1947:						
Jan.	183	252,580	37	29,087	36	71,252
Feb.	270	300,828	36	44,629	17	39,679
Mar.	137	158,530	190	112,132	21	28,898
Apr.	85	106,783	178	86,923	31	48,178
May	212	208,440	524	259,745	86	164,611
June	76	63,612	83	37,314	47	88,420
July	19	24,444	287	122,677	22	50,204
Aug.	151	159,338	143	78,357	19	46,667

Source: U. S. Department of Commerce.



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M&N MACHINE TOOL WORKS, INC.

148 Orono Street **Clifton, N. J.**

Synthetic Rubber

(GR-S, Neoprene, Butyl, and Buna N Types)

(All Quantities in Long Tons)

Year	Production	Imports	Consumption	Exports	Stocks On Hand at End of Period
1941	8,383	.....	6,259	572	1,702
1942	22,434	.....	17,651	1,419	4,612
1943	231,722	.....	170,891	18,148	41,568
1944	762,630	11,043	566,670	104,266	142,927
1945	820,373	10,407	693,580	83,778	203,454
1946	740,026	7,709	761,699*	72,920	114,963
1946:					
Mar.	60,363	1,429	74,214	17,707	115,310
Apr.	66,014	536	70,703	12,878	101,510
May	66,044	366	70,914	13,102	93,447
June	63,388	415	62,899	5,161	94,095
July	63,176	353	54,562	3,175	101,007
Aug.	64,300	634	61,486	2,175	103,076
Sept.	63,705	1,031	58,798	2,480	108,840
Oct.	62,086	1,149	60,729	474	110,913
Nov.	60,305	894	57,794	1,781	113,556
Dec.	62,648	902	53,453	1,857	114,963
1947:					
Jan.	62,103	0	58,764	3,359	115,655
Feb.	59,125	0	53,321	2,166	119,912
Mar.	57,478	0	55,514	704	121,322
Apr.	50,117	4	54,333	357	116,829
May	39,069	0	48,692	433	105,291
June	35,681	0	42,580	2,286	97,612
July	31,917	0	37,607	412	97,728
Aug.	32,901	0	39,001	585	91,288
Sept.	30,518	0	41,777	343	79,128

Source: Civilian Production Administration.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures shown include the output of both government and privately-owned plants. (3) Figures for 1941 are estimated. * Includes year-end adjustment of 5,384 tons to cover non-reporting companies.

Synthetic Rubber—By Type

(All Quantities in Long Tons)

New Supply

	GR-S (Buna S)	GR-M (Neoprene)	GR-I (Butyl)	Buna N Types	Total
1942	3,721	8,956	23	9,734	22,434
1943	182,259	33,603	1,373	14,487	231,722
1944	679,949	56,660	20,252	16,812	773,673
1945	724,859	45,672	52,378	7,871	830,780
1946	613,408	47,766	80,823	5,738	747,735

Consumption

1942	2,579	6,833	22	8,217	17,651
1943	131,977	26,205	304	12,405	170,891
1944	495,552	46,243	10,763	14,112	566,670
1945	600,145	42,394	43,012	8,029	693,580
1946	632,126	44,357	79,228	5,988	761,699

Exports

1942	222	1,037	....	160	1,419
1943	14,937	2,540	40	631	18,148
1944	98,380	4,799	530	557	104,266
1945	76,555	5,837	980	406	83,778
1946	68,763	2,642	495	1,020	72,920

Stocks at End of Period

1942	1,050	1,786	4	1,772	4,612
1943	30,975	6,415	1,035	3,143	41,568
1944	116,130	11,739	9,892	5,166	142,927
1945	170,571	9,703	18,378	4,802	203,454
1946	81,483	10,470	19,478	3,532	114,963

Source: Civilian Production Administration.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures for GR-M and Buna N Types include production of privately-owned plants.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1940	1941	1942	1943	1944	1945	1946	1947
Jan.	40,370	46,190	49,216	36,085	47,540	52,008	51,186	57,119
Feb.	37,557	42,782	42,666	36,274	47,754	48,856	47,889	50,551
Mar.	44,607	49,572	50,820	41,586	52,263	55,364	56,801	59,947
Apr.	47,683	55,879	49,554	48,177	50,005	59,024	62,045	64,140
May	52,946	60,121	53,212	49,828	54,230	60,748	66,774	70,865
June	55,459	59,062	50,077	52,325	54,266	60,580	63,221	71,329
July	53,865	63,906	54,606	49,867	55,119	66,170	69,044	73,441
Aug.	55,346	63,575	48,793	51,880	55,618	70,058	66,701	72,089
Sept.	52,297	59,768	50,093	49,707	56,318	64,529	62,216	.....
Oct.	53,807	58,412	50,094	53,111	53,154	55,708	66,598	.....
Nov.	49,074	54,670	50,729	50,703	54,967	53,543	61,315	.....
Dec.	46,413	53,568	39,250	48,695	52,250	49,745	61,043	.....
Total	589,424	667,505	589,110	568,238	633,482	696,333	734,833	.....

Source: U. S. Bureau of Mines.

Reclaimed Rubber

(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	Production	Consumption Tons	Consumption % to Crude [a]	Exports	Stocks On Hand at End of Period
1936	150,571	141,486	24.6	7,085	19,000
1937	185,033	162,000	29.8	13,233	28,800
1938	122,400	120,800	27.6	7,403	23,000
1939	186,000	170,000	28.7	12,611	25,250
1940	208,971	190,244	29.3	11,347	32,636
1941	274,202	251,231	32.2	13,851	41,750
1942	286,007[b]	254,820	64.6	30,405	42,532
1943	304,058[c]	291,082	59.6	15,678	46,201
1944	260,631[d]	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1946	295,612	275,410	26.5	14,461	33,666
1945:					
Dec.	20,632	19,590	30.5	1,391	28,155
1946:					
Jan.	24,458	22,031	28.5	1,253	29,099
Feb.	23,187	20,702	28.0	1,368	30,216
Mar.	25,136	22,075	26.0	1,841	31,436
Apr.	23,930	22,396	25.8	1,238	31,732
May	25,322	22,162	24.9	1,338	33,554
June	24,882	21,725	27.4	1,416	35,295
July	22,619	21,350	27.9	961	35,603
Aug.	25,798	24,566	27.3	1,093	35,742
Sept.	23,956	23,715	26.4	579	35,404
Oct.	26,322	26,706	27.7	759	34,261
Nov.	24,748	24,385	25.6	1,108	33,516
Dec.	25,254	23,597	25.6	1,507	33,666
1947:					
Jan.	25,545	27,715	26.6	1,443	30,053
Feb.	23,990	25,484	27.3	1,142	27,417
Mar.	26,209	26,157	26.8	1,268	31,940
Apr.	26,696	25,066	25.5	1,073	33,527
May	25,408	21,908	23.1	1,271	37,145
June	24,144	21,283	25.0	1,200	39,598
July	21,252	20,433	26.8	1,052	39,704
Aug.	21,658	21,093	24.4	1,414	40,130
Sept.	22,723	23,879	25.9	902	38,938

Source: 1936-40, Department of Commerce; 1941 to date, Civilian Production Administration.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (a) Includes natural and synthetic rubber. (b) Includes 893 tons of imports. (c) Includes 67 tons of imports. (d) Includes 21 tons of imports.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1930	2,784,745	571,241	3,355,986	1939	2,866,796	704,308	3,571,104
1931	1,973,090	416,648	2,389,738	1940	3,692,328	721,637	4,413,965
1932	1,135,491	235,187	1,370,678	1941	3,744,500	875,381	4,619,681
1933	1,573,512	346,545	1,920,057	1942	220,814	133,083	353,897
1934	2,177,919	575,192	2,753,111	1943	0	4,501	4,501
1935	3,252,244	694,690	3,946,934	1944	0	124,819	124,819
1936	3,669,528	781,862	4,451,390	1945	83,792	313,643	397,435
1937	3,915,889	892,382	4,808,271	1946	2,148,677	930,739	3,079,416
1938	2,000,985	485,852	2,486,837				
1946:							
Jan.	56,367	45,033	101,400	July	209,180	87,591	296,771
Feb.	57,784	34,914	92,698	Aug.	247,261	97,881	345,142
Mar.	85,810	37,636	123,446	Sept.	232,280	95,658	327,938
Apr.	132,631	80,762	213,393	Oct.	283,586	107,154	390,740
May	166,942	75,373	242,315	Nov.	269,081	100,892	369,973
June	141,090	60,038	201,128	Dec.	266,665	107,616	374,281
1947:							
Jan.	246,605	99,818	346,423	July	279,631	97,814	377,445
Feb.	267,015	105,042	372,057	Aug.	261,158	86,509	347,667
Mar.	301,525	118,234	419,759	Sept.	307,879	110,805	418,684
Apr.	314,765	106,984	421,749	Oct.	.....	.....	.....
May	284,357	96,430	380,787	Nov.	.....	.....	.....
June	307,124	91,810	398,934	Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.

Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Rim Production

	1942	1943	1944	1945	1946
Passenger Car	1,025,880	780,291	1,748,917	4,504,368	15,058,469
Truck & Bus	5,298,603	4,949,004	6,391,441	6,486,652	5,939,244
Agricultural	194,900	301,997	997,301	1,441,909	1,735,992
Earth Mover	1,814	945	703	1,308	5,520
Total	6,521,197	6,032,237	9,138,362	12,434,237	22,739,225

	1947 July	Aug.	Sept.	Oct.	Nov.	Dec.
Passenger Car	1,665,587	1,482,922	1,898,907	.....	.....	.....
Truck & Bus	599,064	571,236	572,236	.....	.....	.....
Agricultural	177,163	181,107	201,285	.....	.....	.....
Earth Mover	1,751	775	1,436	.....	.....	.....
Total	2,443,565	2,236,040	2,673,864	.....	.....	.....

Source: The Tire & Rim Association, Inc.

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(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1945 (total)	19,263	29,406	1,514	50,183	49,362	8,196
Passenger Car.	17,063	26,036	948	44,047	43,256	7,054
Truck and Bus	2,200	3,370	566	6,136	6,106	1,142
1936 (total)	21,446	30,866	1,073	53,385	56,041	10,717
Passenger Car.	18,941	26,999	644	46,584	49,013	9,291
Truck and Bus	2,505	3,867	429	6,801	7,028	1,426
1937 (total)	22,353	29,886	1,246	53,485	53,310	10,383
Passenger Car.	20,055	26,177	696	46,928	46,497	8,745
Truck and Bus	2,298	3,709	550	6,557	6,813	1,638
1938 (total)	11,516	30,567	1,049	43,132	40,907	8,451
Passenger Car.	10,086	27,104	580	37,770	35,789	6,937
Truck and Bus	1,430	3,463	469	5,362	5,118	1,514
1939 (total)	18,208	38,022	1,279	57,509	57,613	8,665
Passenger Car.	15,742	33,471	607	49,820	49,933	7,108
Truck and Bus	2,466	4,551	672	7,689	7,680	1,557
1940 (total)	22,252	35,346	1,176	58,774	59,186	9,127
Passenger Car.	19,560	30,903	411	50,874	50,965	7,270
Truck and Bus	2,692	4,443	765	7,900	8,221	1,857
1941 (total)	24,780	39,895	1,489	66,164	61,540	4,436
Passenger Car.	19,855	34,119	586	54,560	50,392	3,165
Truck and Bus	4,925	5,776	903	11,604	11,148	1,271
1942 (total)	6,680	8,872	207	15,759	15,351	6,247
Passenger Car.	910	2,734	38	3,682	2,790	4,432
Truck and Bus	5,770	6,138	169	12,077	12,561	1,815
1943 (total)	6,128	18,547	225	24,900	20,423	1,883
Passenger Car.	82	10,606	71	10,759	7,620	1,132
Truck and Bus	6,046	7,941	154	14,141	12,803	751
1944 (total)	6,654	26,439	263	33,356	33,446	2,013
Passenger Car.	208	18,330	130	18,668	18,819	1,218
Truck and Bus	6,446	8,109	133	14,688	14,627	795
1945 (total)	5,984	36,479	504	42,967	44,524	3,077
Passenger Car.	1,115	25,463	222	26,800	28,200	2,214
Truck and Bus	4,869	11,016	282	16,167	16,324	863
1946 (total)	15,310	65,490	1,512	82,312	82,298	2,448
Passenger Car.	11,086	54,684	653	66,423	66,466	1,763
Truck and Bus	4,224	10,806	859	15,889	15,832	685
1947:						
May (total)	2,005	4,917	361	7,283	8,104	6,426
Passenger Car.	1,603	4,087	190	5,190	6,526	5,039
Truck and Bus	402	820	171	1,393	1,578	1,387
June (total)	2,130	5,094	302	7,526	7,583	6,345
Passenger Car.	1,716	4,345	146	6,207	6,102	4,834
Truck and Bus	414	749	156	1,319	1,481	1,511
July (total)	1,975	5,230	236	7,441	6,790	5,838
Passenger Car.	1,507	4,481	123	6,112	5,475	4,284
Truck and Bus	467	750	113	1,329	1,315	1,554
August (total)	1,723	5,451	276	7,520	7,165	5,464
Passenger Car.	1,414	4,638	122	6,175	5,820	3,905
Truck and Bus	379	813	154	1,346	1,345	1,560

Source: The Rubber Manufacturers Association, Inc.

Cotton, Rayon and Nylon Tire Fabrics

(Production in Thousands of Pounds)

	Cotton				Rayon and Nylon [b]		
	Tire Cord Not Woven	Cord Fabric Woven	Chafer and All Other Tire Fabrics	Total	Tire Cord Not Woven	Tire Cord And Other Tire Fabrics	Total
1943:							
Jan.-Mar.	11,155	34,287	7,819	53,261	564	9,833	10,397
Apr.-June	11,625	34,684	8,549	54,858	1,253	10,185	11,438
July-Sept.	15,754	36,854	9,618	62,226	1,220	9,184	10,404
Oct.-Dec.	15,928	42,639	10,464	69,031	1,806	12,055	13,861
Total	54,462	148,464	36,450	239,376	4,843	41,257	46,100
1944:							
Jan.-Mar.	17,135	42,783	11,452	71,370	1,812	15,830	17,642
Apr.-June	17,587	40,580	11,499	69,666	1,353	19,586	20,939
July-Sept.	16,653	38,462	11,055	66,170	1,299	25,915	27,214
Oct.-Dec.	12,982	34,107	10,948	58,037	2,773	33,630	36,403
Total	64,357	155,932	44,954	265,243	7,237	94,961	102,198
1945:							
Jan.-Mar.	16,671	43,835	12,306	72,812	3,726	37,777	41,503
Apr.-June	16,044	42,383	13,604	72,031	4,064	42,476	46,540
July-Sept.	15,136	38,158	14,122	67,416	3,549	42,606	46,155
Oct.-Dec.	15,514	36,442	13,573	65,529	a	47,734	47,734
Total	63,365	160,818	53,605	277,788	11,339	170,593	181,932
1946:							
Jan.-Mar.	17,128	39,377	15,245	71,750	a	51,208	51,208
Apr.-June	19,622	40,197	18,623	78,442	a	52,511	52,511
July-Sept.	17,279	39,259	18,787	75,325	5,102	46,932	52,034
Oct.-Dec.	20,660	42,668	21,708	85,036	5,858	50,589	56,447
Total	74,689	161,501	74,363	310,553	10,960	201,240	212,200

Source: U. S. Bureau of the Census.

Notes: (a) Included with tire cord and fabrics to avoid disclosures of operations of individual mills. (b) Fuel cell fabrics are not included with rayon and nylon tire cord and fabrics.

Automotive Inner Tubes

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1935	19,218	28,095	754	48,067	47,879	8,231
1936	21,514	32,188	721	54,423	57,036	10,945
1937	22,464	29,554	749	52,767	52,373	10,312
1938	11,515	28,134	644	40,293	37,848	8,166
1939	18,190	31,998	1,002	51,190	50,649	7,036
1940	22,172	29,070	972	52,214	52,237	7,017
1941	24,722	33,749	1,232	59,703	57,433	4,686
1942	n.a.	n.a.	n.a.	13,958	12,568	5,742
1943	6,183	12,373	176	18,732	15,260	2,584
1944	6,461	19,739	190	26,390	26,750	2,823
1945	6,119	33,161	408	39,688	41,102	3,671
1946	15,327	59,357	1,424	76,108	77,251	3,820
1947:						
Jan.	1,922	5,085	181	7,188	8,720	5,075
Feb.	2,129	3,988	171	6,289	7,841	6,621
Mar.	2,460	3,740	266	6,466	7,921	8,050
Apr.	1,897	3,510	324	5,731	7,093	9,480
May	1,980	3,268	323	5,571	5,752	9,772
June	2,154	3,364	260	5,779	5,440	9,252
July	1,970	4,051	196	6,216	4,542	7,909
Aug.	1,792	4,509	197	6,499	5,179	6,937

Source: The Rubber Manufacturers Association, Inc.
n.a.—Not available.

Smoked Sheets—Spot Closing Prices

(New York Market—Cents per pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1910	288	141	206.60	1929	26⅜	15½	20.55
1911	184	114	141.30	1930	16½	7½	11.98
1912	140	108	121.60	1931	8⅜	4⅛	6.17
1913	113	59	82.04	1932	4¾	2½	3.49
1914	93	56	65.33	1933	9⅞	2⅞	5.96
1915	79	58½	65.85	1934	15⅞	8¾	12.92
1916	102	55	72.50	1935	13¾	10½	12.37
1917	90	52	72.23	1936	23	13½	16.41
1918	70	40	60.15	1937	26⅞	14	19.39
1919	57	38½	48.70	1938	17⅞	10⅛	14.64
1920	56½	16	36.30	1939	24	14⅛	17.57
1921	21¾	11½	16.36	1940	24	18¼	20.10
1922	28⅜	13⅜	17.50	1941	24⅞	19⅛	22.40
1923	37⅛	24¾	29.45	1942	22½	22½	22.50
1924	40¾	17¾	26.20	1943	22½	22½	22.50
1925	121	34¾	72.46	1944	22½	22½	22.50
1926	88½	36¾	48.50	1945	22½	22½	22.50
1927	41¾	33	37.72	1946	22½	22½	22.50
1928	41¾	17	22.48				

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1940	1941	1942	1943	1944	1945	1946	1947
Jan.	11.19	10.66	19.85	21.34	20.76	22.36	25.49	32.58
Feb.	11.10	10.87	20.05	21.61	21.34	22.29	26.57	33.91
Mar.	10.90	11.08	20.42	21.98	21.65	22.43	27.52	35.89
Apr.	10.89	11.48	21.10	22.02	21.71	21.88	28.40	35.89
May	10.33	12.97	20.88	21.97	21.63	23.30	28.17	36.51
June	10.72	14.66	19.78	21.92	22.31	23.42	29.89	37.83
July	10.42	16.55	20.27	21.46	22.33	23.27	34.11	38.03
Aug.	9.84	17.06	19.45	21.09	22.11	23.10	36.31	34.83
Sept.	9.69	17.94	19.62	21.10	22.10	23.25	37.59	32.21
Oct.	9.62	17.31	19.79	21.00	22.32	23.85	36.79	32.39
Nov.	9.97	17.21	20.21	20.32	22.13	24.71	31.50	....
Dec.	10.18	18.09	20.55	20.32	22.28	25.21	33.03	....
Average for Year	10.40	14.66	20.16	21.34	21.89	23.25	31.28	....

Consumption of Vinyl Resins

(In Thousands of Pounds)

	Sheeting and Film [a]	Textile and Paper Coating Resins [b]	Molding and Extrusion Materials [b]	All Other [b, c]
1946	52,080	11,673	61,852	27,083
1947:				
Jan.	6,197	1,237	6,802	3,097
Feb.	5,131	892	5,345	2,255
Mar.	5,853	1,142	6,922	3,081
Apr.	5,981	1,425	6,890	2,021
May	4,431	1,432	5,777	1,486
June	3,915	1,084	4,937	1,611
July	3,722	1,537	4,567	1,747
Aug.	4,105	1,650	4,826	2,336
Sept.	....	....	....	....
Oct.	....	....	....	....
Nov.	....	....	....	....
Dec.	....	....	....	....

Source: Bureau of the Census.

Notes: (a) Includes weight of fillers, plasticizers, extenders and safety glass sheeting; (b) Resin content; (c) Includes Adhesives, but excludes data for protective coating resins.

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Rubber Industry Employment, Payrolls, Wages and Hours

Employment — Thousands of Production Workers and Index (1939 = 100)

	1946				1947			
	All Rubber Products		Rubber Tires & Tubes		All Rubber Products		Rubber Tires & Tubes	
Month	Number	Index	Number	Index	Number	Index	Number	Index
Jan.	209	172.7	99	182.4	240	198.8	110	203.5
Feb.	214	177.1	101	187.3	240	198.2	109	201.2
Mar.	220	181.5	104	191.6	238	196.5	108	199.2
Apr.	217	179.1	104	192.8	234	193.5	106	195.0
May	217	179.7	105	193.4	223	184.2	102	188.7
June	221	182.9	106	195.8	219	....	118	....
July	214	177.0	99	183.1	212	....	115	....
Aug.	223	184.0	103	189.9	214	....	...	....
Sept.	229	189.1	107	197.0	...	....	...	....
Oct.	236	194.8	110	204.0	...	....	...	....
Nov.	240	198.8	112	207.0	...	....	...	....
Dec.	242	200.1	112	206.3	...	....	...	....

Payrolls — Production Workers Pay Rolls Unadjusted Index (1939 = 100)

	1945		1946		1947	
Month	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes
Jan.	323.2	342.4	290.1	272.6	386.3	361.2
Feb.	323.6	339.8	292.1	271.9	385.0	357.7
Mar.	315.4	301.9	298.2	281.1	374.3	343.2
Apr.	315.9	306.0	319.7	312.9	383.9	359.2
May	299.8	288.6	322.1	314.2	371.2	349.0
June	304.3	293.8	331.4	318.3	363.4	341.3
July	298.7	286.8	321.4	304.3	....	....
Aug.	231.3	211.4	336.9	311.2	....	....
Sept.	231.3	211.4	363.9	348.9	....	....
Oct.	254.2	239.8	361.3	346.1	....	....
Nov.	257.8	240.2	377.4	360.3	....	....
Dec.	275.5	256.7	392.2	368.9	....	....

Wages — Average Weekly Earnings

	1945		1946		1947	
Month	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes
Jan.	$54.49	$64.29	$46.71	$50.29	$54.03	$59.78
Feb.	54.40	64.04	46.05	49.21	54.06	59.90
Mar.	50.62	57.29	46.46	49.72	52.97	58.05
Apr.	51.93	59.75	49.67	54.77	55.23	61.64
May	50.09	57.32	49.82	54.72	55.30	61.12
June	51.45	59.20	50.45	54.82	55.49	61.35
July	51.81	59.59	50.60	56.11	55.77	62.06
Aug.	46.76	52.81	51.03	55.42	55.60	61.29
Sept.	47.20	53.59	53.69	59.89	....	....
Oct.	45.57	49.48	51.74	57.38	....	....
Nov.	44.68	47.78	52.93	58.87	....	....
Dec.	45.48	48.54	54.63	60.46	....	....

Wages — Average Hourly Earnings

	1945		1946		1947	
Month	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes
Jan.	$1.151	$1.317	$1.121	$1.255	$1.330	$1.511
Feb.	1.149	1.314	1.129	1.266	1.331	1.517
Mar.	1.117	1.260	1.138	1.275	1.330	1.512
Apr.	1.136	1.294	1.232	1.414	1.397	1.608
May	1.132	1.284	1.266	1.446	1.416	1.622
June	1.140	1.307	1.283	1.461	1.419	1.615
July	1.138	1.296	1.292	1.472	1.446	1.640
Aug.	1.119	1.269	1.295	1.474	1.446	1.641
Sept.	1.098	1.243	1.323	1.507	....	....
Oct.	1.100	1.231	1.313	1.492	....	....
Nov.	1.112	1.249	1.322	1.503	....	....
Dec.	1.113	1.247	1.331	1.513	....	....

Hours — Average Weekly Hours per Worker

Month	1945	1946	1947	Month	1945	1946	1947
January	47.3	41.7	40.6	July	45.5	39.2	38.6
February	47.3	40.8	40.6	August	41.8	39.4	38.4
March	45.3	40.8	39.8	September	43.0	40.6	...
April	45.7	40.3	39.5	October	41.4	39.4	...
May	44.2	39.4	39.0	November	40.2	40.1	...
June	45.2	39.3	39.1	December	40.9	41.2	...

Source: U. S. Department of Commerce.

Indexes of Production, Shipments and Inventory For The Rubber Industry

Production 1935-1939 = 100 (Based on man-hours)

Month	1945	1946	1947	Month	1945	1946	1947
Jan.	247	215	247	July	218	211	207
Feb.	247	216	246	Aug.	193	221	208
Mar.	236	221	239	Sept.	172	234	...
Apr.	233	219	234	Oct.	191	234	...
May	224	215	220	Nov.	192	243	...
June	222	218	216	Dec.	205	252	...

Shipments—Average Month 1939 = 100 (Based on $ Value)

Jan.	311	229	290	July	274	268	...
Feb.	351	242	315	Aug.	255	282	...
Mar.	351	260	322	Sept.	200	311	...
Apr.	356	282	311	Oct.	260	333	...
May	333	288	300	Nov.	212	313	...
June	333	293	301	Dec.	292	352	...

Inventory — Average Month 1939 = 100 (Based on $ Value)

Jan.	170.6	173.7	238.0	July	183.3	195.0	....
Feb.	176.7	179.9	250.0	Aug.	182.4	198.0	....
Mar.	175.5	186.4	262.0	Sept.	177.4	204.0	....
Apr.	175.3	198.5	273.0	Oct.	167.7	212.0	....
May	178.3	195.5	282.0	Nov.	167.1	215.0	....
June	178.7	192.4	291.0	Dec.	169.0	216.0	....

Source: U. S. Department of Commerce.

Various Compounding Materials Consumed by the Rubber Industry

Material	1940	1941	1942	1943	1944	1945	1946
Asphalt [a]							
Short tons	22,772	20,536	22,263	16,510	20,189	19,483	28,715
% of total	0.9	0.6	0.6	0.5	0.6	0.5	0.7
Barite (Barytes):							
Short tons	4,283	9,800	6,334	8,000	10,000	10,000	20,000
% of total	2.3	4.2	3.6	3.9	2.9	2.1	4.4
Carbon Black:							
Short tons	155,090	219,751	147,974	236,737	369,015	402,193	470,732
% of total	58.5	68.2	65.8	75.2	78.7	78.9	74.1
Clay, Kaolin:							
Short tons	92,640	127,055	51,334	50,964	59,588	109,936	162,393
% of total	11.1	11.6	5.1	5.5	6.8	11.7	12.3
Clay, Fire & Stoneware:							
Short tons	10,104	9,000	5,000	10,259	7,160	7,800	12,951
% of total	0.4	0.2	0.1	0.2	0.1	0.1	0.2
Lead Sulfate, Basic:							
Short tons	128	200	89	131	268	200	.....
% of total	2.1	1.9	1.1	2.3	4.2	5.2	.....
Lime:							
Short tons	1,879	3,058	1,381	2,039	5,634	7,170	3,193
% of total	0.03	0.05	0.02	0.05	0.13	0.10	0.1
Litharge:							
Short tons	1,590	3,968	3,460	4,302	3,023	1,864	2,131
% of total	1.8	3.3	3.8	3.8	2.2	1.3	1.6
Lithopone:							
Short tons	3,387	3,547	1,047	1,078	726	977	1,607
% of total	2.2	2.0	0.8	0.8	0.5	0.7	1.1
Mica, Ground:							
Short tons	1,731	3,476	1,754	3,063	1,137	3,715	4,951
% of total	6.2	8.0	3.7	6.0	2.2	7.0	10.6
Sulfur:							
Short tons	54,000	63,000	40,000	51,000	63,000	64,960	72,800
% of total	2.5	2.4	1.4	1.8	1.9	2.0	2.2
Talc [b]							
Short tons	28,501	58,114	40,487	48,994	51,833	63,758*	65,980
% of total	10.0	13.9	10.0	11.8	13.0	16.0	14.4
Zinc Oxide:							
Short tons	70,979	90,429	52,717	67,898	59,518	63,447	83,776
% of total	62.8	63.4	53.0	47.4	42.3	49.6	53.1

Source: U. S. Bureau of Mines.

Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes pyrophyllite and ground soapstone. * Revised.

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State of New York } ss.
County of New York }

Before me, a notary public in and for the state and county aforesaid, personally appeared Peter P. Pinto, who, having been duly sworn according to law, deposes and says that he is the Business Manager of The Rubber Age and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Section 537, Postal Laws and Regulations), to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers, are:

Publisher, Palmerton Publishing Company, Inc., 250 W. 57th St., New York 19, N. Y.; Editor, M. E. Lerner, 250 W. 57th St., New York 19, N. Y.; Managing Editor, None; Business Manager, Peter P. Pinto, 250 W. 57th St., New York 19, N. Y.

2. That the owner is (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given):

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3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are:

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholders or security holders appear upon the books of the company as trustees or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest, direct or indirect, in the said stocks, bonds, or other securities than as so stated by him.

PETER P. PINTO, Business Manager.

Sworn to and subscribed before me this 23rd day of September, 1947.
(SEAL) HERMAN CASAROFF, Notary Public.
(My commission expires March 30th, 1949.)

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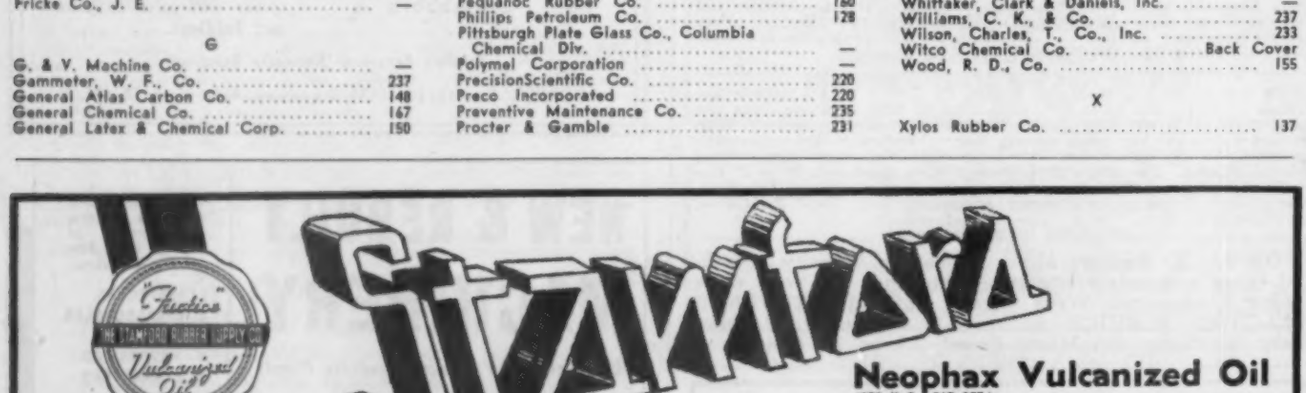

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